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I.

THE PRESIDENT'S ADDRESS.

By HOSMER A. JOHNSON, M. D., LL. D.,

Of Chicago, Ill.

Mr. Chairman, Gentlemen of the Brooklyn Committee:—I cannot in adequate words express the thanks of myself and my fellow-members for the generous hospitality with which we have been received in your city, and for the very kind words which have been spoken to us this evening in the way of welcome. Our acts and our proceedings must testify the interest which we feel in the cause for which you have done so much in the way of providing for the transaction of our business, and in bringing together such an audience here interested in sanitary matters, and for giving us such an opportunity to do, as well and wisely as we can, the work which we have in hand.

Gentlemen of the Association, Ladies and Gentlemen:—Article second of the Constitution of the Association declares "That it shall be the purpose of this Association to advance sanitary science, and promote organizations and measures for the practical application of Public Hygiene." This organization was not intended to be, nor has it ever been considered to be, a purely medical organization, but a public organization, in which not only the profession of medicine, but members of other professions, or persons devoted to other occupations, may find a place to work for better health and longer life.

In the furtherance of this object, it has seemed wise that there should be at its annual meetings not only papers upon purely scientific subjects, but that also, in the form of essays and public addresses, an effort should be made to secure the interest of those of our citizens who have no official or professional relations to this work. In other words, an effort should be made to interest the public in the great object or purpose of preventing sickness and prolonging life. To do this we must demonstrate the truth of the maxim of one of our greatest philosophers, that "Public health is public wealth." I shall not therefore offer an apology to the gentlemen of the Association, who devote themselves more exclusively to purely scientific matters, for addressing myself, not so much to the scientist or to the professional sanitarian, as to the people, to the public, who by their presence here to-night give evidence of sympathy and interest in our work, or, rather, their work, and to whom, after all, we must look for means to carry out such measures as science shall demonstrate to be for our race most beneficent. It is proper, therefore, that we should meet you, that we should consult with you, and have your advice and sympathy in whatever we may decide upon as finally best adapted to accomplish this great and desirable end.

Through the ages but little has been done to prolong life and mitigate distress. We know now that much can be done, much that is not done, for the accomplishment of these results. The world has, in action, never utilized its fullest capacity for work; in achievement, it has never reached its power to do. This is true along all the lines of social and public activity. It is no more true in preventive medicine than in other departments of public endeavor. One of the greatest difficulties in the way of accomplishing more in sanitation has been, and, I fear, always will be, this, that we do not fully and certainly know all of the causes of our suffering, the agencies of our destruction; and consequently the great public are skeptical, as well they may be, in view of the past history of our civilization, as to the measures proposed for relief, for the prolonging of life. We know, however, that some progress has been made—we do not know exactly how much.

Of the beginnings of this desirable kind of knowledge we know but little. It is certain, however, that the cradle of our literature upon this subject was the old Ægean sea and its islands, the names of many of which are embalmed in song or story of ancient Greece. On a high promontory of one of these, in the dim twilight of antiquity, a temple had been erected to Æsculapius. A few miles back, at the base of a line of low hills, there gushed from the rock a stream of warm, life-giving water. Its properties were such as to invigorate and strengthen the wearied and exhausted, and especially to restore to the blood the qualities in which it is usually deficient in malarious countries. In a word, they were chalybeate. Rich in iron, they met most fully the needs of the dwellers along the shores of the islands and the continent and the crowded cities of Greece. To this temple and fountain the sick from many lands had come, and there had been abundant opportunity to test the healing qualities of the waters. Those who had received benefit had hung upon the walls or had inscribed on tablets, which were placed around the temple, brief histories of their diseases, and the results of their offerings to god and goddess. Here, in the fifth century before our era, a young student from a neighboring city, descendant of a long line of priest physicians, established his home. He was a lover of nature, and we may presume that he had been attracted in part by the beauty of the island, with its ridges of low mountains or, rather, hills, which skirted the southern border, and which gave birth to cool streams of delicious water, destined to give fertility to the northern slopes, the land of the grape, the home of the most generous of wines. The scholar had lingered, not so much for the beauty of the landscape, however, or for the delicacy of the fruits, as for the interest which he felt in the curative properties of the fountain itself. While he believed in the gods, he was, nevertheless, a close observer of nature. Here in the temple had already been established a school of medicine. The facts were the inscriptions just alluded to, placed upon the walls, left by those who had been cured by their visit to the temple and the grove, and in answer to their prayers to the divinities of health and medicine. The young truth-seeker approached reverently the altar, but looked at the phenomena occurring under these influences as, nevertheless, the product of something in the world of matter. Time passed swiftly and happily in the pursuit of a more reasonable understanding of disease and its cause, and a more accurate knowledge of the instrumentalities by which it is modified.

His fame began to spread through the islands and to the shores of Asia and Europe. Numbers came to consult him. His advice was sought in times of pestilence, and he had come to be regarded as one of the wise men of his age. Whether myth or history, we know not certainly, but the story is, that while he was patiently pursuing his studies, and questioning nature, a messenger from the chief city of Greece landed upon the island. The angry gods, so the stranger said, had stricken, in their wrath, the whole population. The peasant and the prince fell alike beneath the arrows of the destroyer. The chief ruler, in his great distress, had sent for the master. His favorite son had already fallen, and he himself had been accused by the people as the author of the scourge. He therefore prayed the learned man to visit the suffering city, and advise what should be done to save, if possible, the remnant of the plague-stricken inhabitants.

In answer to the summons, the physician immediately prepared to leave his pupils, for he had already many such, and enter, as his followers have since so often done, the field of death. He gave a few simple instructions to those best fitted to carry on his work, and at once embarked. On reaching his destination, he found the city in a condition which the graphic pen of her chief historian has made to us so fearfully realistic. His first act was to note carefully the soil and drainage of the parts most severely afflicted. He also investigated the water sources. He studied the climatic conditions, and especially did he carefully note the occupations and habits of the inhabitants. He observed that filth everywhere abounded. While there was great magnificence in the architecture, and the palaces of the rich were in the most wonderful condition of adornment, there was beneath all this opulence of display a reeking hotbed of foul matter giving off the most disagreeable and offensive odors. Under his advice, there was an effort made to purify, so far as possible, the atmosphere. The city was besieged by an enemy, and the thickly crowded metropolis did not present a promising field for sanitary work. In the meantime, the great ruler, broken with his many cares and ill requited labors, was himself prostrated. The end was soon reached, and the greatest of the Athenians, Pericles, was among the immortals. Hippocrates returned to Cos, there to ponder upon the lesson which had been opened before him in the plague of Athens, and to write his book on "Airs, Waters, and Places"—the oldest treatise of which we have any knowledge on hygiene or public health. We find stated in it, with almost the definiteness of modern sanitary science, the great importance of pure water, as well as some of the diseases which are likely to result from the presence of filth. From the time of the father of medicine to the sixteenth century, we have but very little progress in the work of saving life. The older doctrines as to the cause of disease, whether among pagan or Christian peoples, were not encouraging to efforts in this direction. It has therefore come to pass, that measures looking to the prevention of disease by the use of scientific methods are modern.

The maxims of Hippocrates, the ceremonial of the Hebrew law as to bathing, and the establishment of quarantines are almost the only exceptions. For the most part, suffering has been regarded as an infliction of the gods, or, among Hebrews and Christians, as a dispensation of Divine Providence.

The accounts we have of the pestilence of Egypt and the plague of Athens in the earlier centuries, and the visitations of Florence, London, and other cities in modern times, illustrate this tendency of the human mind, in the midst of its sorrow, to turn to the supernatural. Sacrifices among the pagans. fasts and discourses upon the terrible judgments of God among Israelites and Christians, have been regarded as among the most efficient means for the arrest of the scourge. The profession of medicine in olden times could do but little in the way of educating people in better methods, and in leading them to the use of more efficient measures for the maintenance of public health.

So long as life and its disorders were made to depend upon the unknowable, but little encouragement could be found, in fact, for an effort to prolong the one or to prevent the other. Even the materialists were content with phenomena, and wearily warred with existing conditions. Slowly, with the revolving centuries, better notions of the conditions of life have been reached. A better understanding and observation of sanitary laws have been brought about. Gradual changes in the modes of living and larger means of comfort on the part of the people have been accomplished. With all these improvements, something has been done towards increasing the length of life. We have, as a race, made some progress, and, by surviving, we have demonstrated our fitness to survive. We do not know accurately the death-rate in the earlier centuries, but we do know that famine and pestilence carried away its hecatombs. As we come to more recent times we reach some approximation, at least. to accuracy. In the seventeenth century, and for some hundreds of years before, the population of England and north-western Europe had remained, if not stationary, with, at least, only a very slow growth. The cities, it is true, increased in population, but this increase could only be appreciated by comparing periods separated by many years. The agricultural districts very slowly became occupied. Life was short, and its product small. After the revival of learning, the great awakening of the sixteenth century, however, life became more valuable, and it was worth while to make a greater effort to save it. In the diaries of individuals and in the writings of medical men we find some information, meagre, it is true, but some statements as to the life movements of the dead old centuries.

Allusion has been made here to-night to the plague of London, only two hundred years ago; and if we could present that picture to you, it would be most appalling. A few facts in the sanitary, or, rather, unsanitary, history of London during the seventeenth century, are suggestive of what was frequently taking place over all the then civilized world. These facts also give us a satisfactory explanation of the slow growth of the population of that century as compared with the nineteenth. Evelyn says, in his diary,—"In 1625 the plague caused the death of 5,000 a a week during a part of the summer." In 1665, July 16, he writes,—"There died of the plague in London this week 1,100." In the week following, 2,000. August 8, he writes in his diary,—"Died this week in London, 4,000." August 15, the same summer,—"There perished this week 4,000." He seems to have left the city for a while, for, on September 7, he says,—"Came home; there are perishing nearly 10,000 poor creatures weekly." This is the testimony of a man of letters, of a man who has given us a faithful picture of the daily life of his times.

The evidence, however, of this state of things does not depend alone upon the testimony of laymen. One of the greatest of English physicians, Sydenham, says of the same summer,—"There died in one week 8,000, while two thirds of the population were out of the city." The population of London is not certainly known at that time, but probably it was not more than half a million, as it was only something over 800,000 at the beginning of the present century. It is difficult for us to imagine what might be our own conditions under circumstances similar to those which prevailed two hundred years ago in London.

Small-pox also ravaged the cities of Europe in winter, while plague decimated them in summer. Another writer, who has left a diary which will be a picture for all time of his own age (Pepys), says, casually, in the discussion of other subjects,—"The deaths from small-pox increased 500 more this week than last." What should we think in Brooklyn to-day with 500 deaths more this week than last week from small-pox, with the probabilities that last week the number reached into the thousands! Vaccination, ladies and gentlemen, against which there are some, even to-day, who cry out, has saved you and the large cities of our world from such a fate as this. The same writer gives a picture, which, I am sure, will appeal to the ladies of this audience, when he describes the appearance of almost every one met in the streets. They were pitted and scarred so that it was almost impossible to recognize them. "It is not only the deaths that appal us," he says, "but the terrible disfigurement of the living." There was no effort to escape it, except by flight to the country.

The plague was supposed to be a necessity, growing out of what was commonly called "the medical constitution of the air,"—a necessity recurring about once in thirty or forty years. Small-pox was always present, and caused the death of one sixth of the population of the larger cities of Europe. The death-rate was greater than the birth-rate, and the population of London and other cities was maintained by a constant influx from the provincial districts. During all this time, the means of communication were few, and *a priori* we should not expect contagious diseases to spread with anything like the degree of rapidity made possible in this age of railroads and steamships.

How much the death-rate has been reduced in England during the last two hundred years we do not certainly know, but there is reason to believe that in London it has diminished from 40 or more in the 1,000, at the beginning of the present century, to about one half that number. The plague is a grim spectre of the dead past. Small-pox is a Samson shorn. The increase in population has been correspondingly rapid. I think we may safely infer that the diminution in the death-rate and the increase in the population throughout Great Britain have borne some proportion, at least, to what has been accomplished in the metropolis. Up to this time the cities had grown slowly; the agricultural districts had only been partly filled; but within the last three quarters of a century the towns have been rapidly increasing in population, while throughout the agricultural districts the population has also been rapidly increased. This has been accomplished, notwithstanding the fact that millions have come from the British Isles to our own shores, while yet other millions have found homes in other lands. This increase in population and this lowering of the death-rate have not grown entirely out of improved medication, but, in part, from better habits of living, larger means of comfort, and an unconscious education, to some extent, in sanitation. A great change has been wrought in this last three quarters of a century. We know much more accurately how long people live, from what causes they die, and at what ages they die. We begin to see more clearly how the death-rate can be still more reduced.

If we follow the course of a given number of individuals from birth to death, as we can well do by the aid of statistical tables, we shall find that in England and Wales, out of one million persons born, more than one fourth die in the first five years. If we divide the country into healthy and unhealthy districts, grouping together the different cities and counties according to the death-rate, we find that in the healthy districts only about one sixth of the million die within this period of five years, while in the unhealthy districts, of which Manchester may be taken as a type, nearly one half of the million born, die within the first five years. In other words, of a million children born in the unhealthy districts, more than 280,000 die within the first five years for the want of proper sanitary care; 280,000 would have lived beyond this five years if they had been born in the healthy districts.

The same startling contrast between the worse and the better districts will meet us if we study the later life history of this one million of human beings.

By coöperation on the part of the people, the unhealthy districts might be made as healthy as London, and as the other provincial towns and shires in which the death-rate is low. In fact, Liverpool has, within the last twenty-five years, been transformed. It was one of the most unhealthy—it is now one of the most healthy—of English cities. The application of money by scientific methods might change all this, and prevent this fearful slaughter of the innocents.

Professor Tyndall very justly says, in the preface to one of his books, "Essays on Dust and Disease," and in other papers,—"On public sympathy the sanitary physician has mainly to rely for support in a country where sanitary matters are left so much in the hands of the public itself as they are in England." He might have added, and still more so in the United States. "But," he continues, "sympathy without cause, that is, without some basis of knowledge, is hardly to be expected."

Tyndall and Huxley, with a host of co-workers in every department of knowledge, have done much to supply this cause of sympathy, this base of knowledge. With the development and growth of one new science in these later times, with a better knowledge of the conditions of life and the modes and means by which it is modified, another new science has been brought into existence. As a legitimate result of the study of the problems of biology, we have almost created hygiene, or the science of health. Within the last century very great additions have been made to our knowledge of the causes of disease, and the means by which we may prevent it. With this increase of knowledge, the practice of medicine has come to mean something quite different from what it did in former days. It is no longer the mere study of symptoms and the prescribing for the sick. It means vastly more than this. It implies a study of the environment of our patient, an investigation of the habits, occupations, dwelling, food, drink, clothing, light, air, temperature, mental and emotional states, etc., in short, everything that may have any influence upon the physical and psychical conditions of the individual. Many of these conditions are subject to control, and may be modified as necessary for the good of the individual.

A death from typhoid fever, which was once regarded as a mysterious dispensation of Providence, now means foul water, foul food, or foul air. A city is decimated by a pestilence, and it is found that its foundations are honeycombed with cesspools, and its drinking-water is diluted sewage. The judgments of God, in the light of these revelations, become no more mysterious than the pains of the child that laughingly thrusts its tiny finger into the brilliant flame, only to feel the terrible infliction that follows.

There has come to be an enthusiasm in the medical profession on this subject which has made itself felt in various ways. This zeal has communicated itself to the public. It is contagious, if I may use the term. It is well known that some diseases are communicable, but only to those who have what has been called a susceptibility to them. So it is with these notions about health. The public has become susceptible, as it never was before. As in the study of hygiene, a knowledge of biology on the part of the profession was found to be a *sine qua non*, so, in the effort to popularize knowledge on the subject of personal and public health, some acquaintance with general science must prepare the way for life and health studies. The possession of this knowledge constitutes the susceptibility of which I have spoken. Never has there been such a general diffusion of scientific information as during the last quarter of a century. Manuals and primers of science, scientific journals, magazines with scientific articles, newspapers with columns devoted to science, reports of scientific societies, scientific lectures, etc., etc., have all contributed to saturate the public mind with some sort of scientific notions. It is true, that much of this which passes for science is crude; much that is believed to be true is false; but there remains an eagerness for information upon scientific matters which has never been seen in the history of the race before this last quarter of a century. It has led the public not only to study the problems of mechanical science as applied to the practical affairs of life, but it has led them also to investigate science in its relation to the social and to the political conditions of society, as well as to their conditions of health and longevity.

With this aptitude, if I may call it so, to learn, there has come to be a special demand for the kind of knowledge bearing upon health. It is only a few years—within the remembrance of every one of us—since an effort to instruct the public in the management of their own homes, in matters such as wells, cisterns, cellars, drains, light, and clothing, especially any intimation that kitchens, alleys, and out-houses were filthy, would have been regarded as an impertinence. But the time has come when the community, in the midst of any danger or any threatened danger, immediately consults some one competent to advise them upon the conditions of these necessary appurtenances of health and living, and are quick to make the application of such advice as may be given them. This is an indication of the susceptibility, which I have alluded to, on the part of the public, to sanitary notions.

We shall always be needing more knowledge, and, I trust, shall always be gaining it; but, just now, with the accumulations of science, it seems to me that what we greatly need is a better and more thorough application of truths already demonstrated, of the facts already known. The application of these truths divides itself into two great fields. In the first kind of work, we have to do with personal health. This concerns us individually, but it shall not engage our attention to-night. It implies the study of what may be called the subjective facts, as well as the habitat of the individual. They mean his modes of life, his indulgences, his excesses, together with his surroundings, etc.

The other field, and the one to which I more particularly desire to call attention, embraces the problems of public health. Society has always recognized evils growing out of aggregation, and has sought to control these evils. By legislative enactment and the establishment of police regulations, an effort has been made to secure the greatest good to the greatest number. Persons and property have been protected, crime has been punished, and mainly with the motive to prevent crime. In these later years, the obligation of the public to protect not only the worldly goods of the citizen, but also his health, begins to be realized. An intelligent foundation has been laid for sanitary reforms. These consist, first, in the collection of statistics by which the value of certain procedures may be determined. These accumulations serve as material out of which may be developed more accurate knowledge and better methods. Government begins to recognize a responsibility in these matters. But, for the most part, legislation is still crude, and the administration of sanitary laws full of blunders. In this respect the history of sanitary enactments and their execution does not materially differ from that of other social and political reforms. It is the want of accurate knowledge that leads to our mistakes of legislation; the want of practical acquaintance with the methods of administration that leads to the blunders to which we have referred.

A wise man and a great statesman has said, "Under misfortune it often happens that the pressing peril of the hour so completely confounds all the faculties that no future danger can be properly provided for, can be justly estimated, can be so much as fully seen." And hence it has come to pass, that as our oldest literature on sanitation was born of the pestilence, so our legislation has been stimulated by epidemics, has been framed in the presence of danger, and has, for the most part, been provisional. It will always be impossible to create and to enforce laws in a country like our own which do not meet with the approval of the great mass of the people, and hence this improvement in sanitation or in sanitary legislation must be based upon knowledge. We must have this saturation of the public with the notions of sanitary science. It cannot be expected that this general or public knowledge will be technical; it must be general, and related to the results that can be reached by scientific means and methods,—a knowledge that begets faith in the agencies of protection and that secures efficient coöperation, and not, as has been too often the case, obstruction in the execution of sanitary laws.

There are dangers, however, in this field of work, as in most others, that grow out of a smattering of knowledge. There will always be those who claim too much, who speak as having authority, but have not the wisdom to see the limitations and difficulties in the way of practical results. It is the province of this Association and of just such meetings as we have here to-night to strive to instruct and interest the great public in the work of preventive medicine; but, nevertheless, the task of devising the methods must remain in the hands of those who have special knowledge of these matters. These specialists should not be taken wholly from the profession of medicine alone. As an illustration of what a layman can do, I have only to mention the name of England's greatest sanitarian, Sir Edwin Chadwick, who for fifty years has labored in the cause of public health. During this half century he has done more to improve the condition of London and other English districts than any other citizen, in however high official or social position. He has reached the homes of the people, and helped all classes of society. If we are to reach that measure of success which we believe to be possible, the world must not be left entirely to the medical profession, or to health officers; sanitary engineers and men in all departments of effort must be enlisted in this work.

The egotism that leads manufacturers and others engaged in the various industrial occupations to ignore, in their eager pursuit of wealth, the public welfare, will continue to be an obstacle to the enactment and execution of health laws; but this general enlightenment on the part of the public, which we so confidently look for, will compel obedience to these as well as to other forms of police regulation.

It is only within the last few years that sanitary organizations have come to be recognized as a necessary part of the machinery of state. Within the memory of many here present, there was not an efficient board of health in any city or state of this country, or, in fact, of the world. Police regulations establishing quarantine, it is true, existed, but these quarantines, instead of being beneficent in their character, were often useless, and in many instances they became monstrous crimes against humanity. All this is being changed. Society recognizes its obligations in two directions: First, to remove from its midst or destroy every possible source of disease, and to so control the causes that cannot be removed or destroyed as to diminish to a minimum their deleterious influences upon public health. Secondly, the obligation to prevent the introduction of disease from without by such measures as shall be found the most efficient for the accomplishment of this end, and at the same time work the least amount of inconvenience to the social and commercial interests of the community.

For the accomplishment of the first purpose we have already done something, but there remains much more to be done. There should be in every town or city or district a health authority. Under the direction of this authority there should be a survey first made with a view to determine the presence or absence of the physical conditions that unfavorably affect health. This study should include not only the natural conditions, such as the climate, soil, exposure to the sun and air, neighborhood, including water, wood, and elevation, etc., as suggested by Hippocrates many centuries ago, but it should also embrace the condition of the population, their nationality, occupations, dwellings, density, and food. It should also show the methods of removal of accumulations, and the disposal of sewage and garbage, the condition of streets and alleys, and the character of the drinking-water. There should also be noted any special industries by which air or water may be contaminated. The bearing of most of these different industries upon health is now well known. In addition to these studies of the surroundings and the activities of the population, there should be a careful collection and preservation of the statistics of births, deaths, marriages, the prevailing diseases, the causes of death, and the increase or decrease, if such be the case, of population.

This is only a suggestion of a few things that should be done, and these should be done in the smaller towns and villages as well as in the larger cities.

With a knowledge of these matters, intelligent measures could be taken to reduce to a minimum the evils that grow out of our gregarious necessities. I think we may safely believe that since the people already begin to realize the need of such measures, the time is not far distant when a health organization will be as much of a necessity in every political unit as a constable or justice of the peace. These health organizations of the smaller corporations, such as towns and villages, should be brought together by the county or the state. By the larger bodies there should be secured uniformity of methods of procedure, such as the registration and classification of statistics. Information should be exchanged in this way as to the sanitary condition of communities. Concerted action should be taken for combating a common foe. How far this has been realized, many of you perhaps know, or, rather, many of you know how far short of this realization we are to-day. We have in the most of our large cities, as departments of government, health boards or commissioners of health. In a majority of the states we have state boards of health, and in many of the counties or townships smaller organizations have been established; but this is by no means general or uniform. These are all recent improvements growing out of this susceptibility of the public to sanitary notions. Our state boards of health have all been created within the last thirty years. It is the contagion of sanitary science that has induced the public to create these agencies. They are the beginnings of better things.

In addition to all these, what we now greatly need is a national authority with adequate powers and means. As national wealth is made up of individual wealth, so national health is the aggregate of individual health. Business motives and business methods should enter into its conservation. As a money value certainly attaches to human life and human activity, it should be guarded as any other form of productive capital.

That more money and care should be given to preserve the lives of our cattle than of our men, women, and children, seems strange. Government carefully looks after the one and carelessly neglects the other.

As typhoid fever is a greater calamity than Texas fever, as Asiatic cholera is more to be dreaded than hog cholera, so do we need a Department of Public Health more than a Department of Agriculture; a Bureau of Vital Statistics more than a Bureau of Animal Industry. Our national legislators create the machinery and appropriate money for the brute, because, forsooth, it is property, and then grudgingly, if at all, look after the lives of our loved ones, because they cannot be bought and sold. In all this they do what they have reason to believe their constituents demand. It is not so much the legislators, as we, the people, who are at fault.

Let us see to it, then, not only as sanitarians but as citizens, that our national government shall give as much care to our homes, to our women and children, as it gives to our property and to the lives of our flocks and herds.

The second part of the work of health organizations relates to the exclusion of communicable diseases. For this purpose, control is exercised over the introduction of goods and persons that may be the bearers of disease. This supervision is called quarantine, but it is quite a different affair, as understood and practised by modern sanitarians, from the quarantine of a few years ago. It is no longer, as the word itself implies, a detention of forty days, or of any other definite number of days, but only so long as is necessary for a thorough cleansing and destruction of whatever causes of disease may be attached to persons, goods, or conveyances.

It requires as a condition for effective work the collection and preservation of information bearing upon the sanitary condition of the commercial world. For this information reliance should not be placed alone upon the reports of consular or commercial agents, or the official reports of foreign health officers. There should be placed at the principal centres of infection competent persons in the pay of the home government, instructed to forward not only such documentary evidence as may be obtained as to the health of the port, but in addition to this he should be required to collect and transmit all possible facts derived from other sources bearing upon the sanitary condition of the place. He should also be required to ascertain all possible information as to the sanitary history of vessels sailing from infected ports for any port under the jurisdiction of the home government. This information should be sent by cable when the vessel itself is not the bearer of a certificate or bill of health from the health inspector or agent of the home government.

Upon the information thus secured, proper measures can at once be taken upon the arrival of a vessel from infected places. Detention of vessels and injury to commerce will be lessened, and public confidence in the efficiency of the modes of procedure will be increased. We have already abundant evidence of the value of sanitary measures based upon knowledge obtained by the methods we have suggested, and carried out by well considered agencies and appliances. The efforts of sanitarians and sanitary bodies, and the increased enlightenment of the public in matters of sanitary science and their greater interest in this subject, have already diminished the relative frequency of those forms of disease that are in a measure preventable. Richardson, in his "Preventive Medicine," gives a summary comparison of the deaths in England and Wales from the principal classes of disease, in the years 1847 and 1880. In 100 deaths from all causes, *Zymotic Diseases*, *i. e.*, filth diseases, caused 23.26 in 1847; 20.00 in 1880. Consumption 12.67 in 1847; in 1880, only 9.12. Deaths from other diseases of the respiratory organs, influenced by the inhalation of atmospheric particles and irritant gases inseparable from the unconsumed smoke and the other by-products of manufacturing establishments, were increased from 12.14 in 1847, to 14.78 in 1880. Those from diseases of the brain, nerves, and senses were 11.54 in 1847; 13.12 in 1880,—illustrating, probably, the increased wear and tear of the nervous system caused by the greater demands of modern life upon our mental and physical organisms. Deaths from diseases of the digestive organs have diminished from 5.82 in 1847, to 4.74 in 1880, indicating better food and less intemperance.

This table forcibly illustrates the benefits accruing from better personal habits of individuals, and from the greater attention paid to private and public hygiene, and also, in case of consumption, to the increasing belief that in its early stages, at least, it is not necessarily incurable; that it is communicable, and that measures for prevention are of value.

The proportion of filth diseases to all other diseases has been diminished still more within the last few years, since 1880.

The death-rate of the principal cities of Europe and America is given in the following tables for the year 1888, except in a few instances where portions of 1889 are included in the twelve months. In its wide range of localities and large numbers it furnishes the basis for an approximate estimate of the vital capacity, or of what may be called the viability of the urban population of the civilized world.

VITAL STATISTICS OF THE PRINCIPAL CITIES OF THE UNITED STATES AND EUROPE.

Place.	Year.	Population.	Total Deaths.	Rate per 1,000.	Zymotic deaths.	Zymotic deaths per 1,000 from all causes.
Baltimore	1888	500,343	8,936	17.8	1,456	163
Boston	"	415,000	10,189	24.5	1,841	181
Brooklyn	"	757,755	18,061	23.7	4,381	233
Buffalo	"	216,409	4,919	22.1	1,293	255
Charleston	"	60,145	1,867	30.5	82	47
Chicago	"	830,000	15,772	19.0	3,952	250
Cincinnati	1887–8	325,000	6,276	19.2	1,451	231
Cleveland	1888	235,000	4,414	18.7	1,278	286
Columbus	1887–8	101,000	1,285	12.7	304	236
Detroit	1888	215,000	3,833	17.3	1,043	272
District of Columbia	1887–8	225,000	5,040	22.4	1,123	227
Hartford	1888	51,000	1,075	21.0	231	215
Milwaukee	"	190,000	3,426	16.2	629	188
Minneapolis	1888–9	200,000	2,689	13.4	671	249
Nashville	1888	65,153	1,066	16.3	232	217
Newark	"	174,011	4,062	23.6	810	199
New Haven	"	82,000	1,594	19.4	396	248
New Orleans	1887	242,750	6,075	25.0	918	151
New York	1888	1,526,081	40,191	25.9	9,646	234
Philadelphia	1887	993.801	21,719	21.8	3,477	161
Providence	1888	123,000	2,608	21.2	571	218
Richmond	"	100,000	1,971	19.7	267	135
Rochester	"	110,000	2,114	19.2	411	194
St. Louis	"	430,000	9,015	20.8	2,133	225
St. Paul	"	175,000	2,078	11.8	500	241
San Francisco	"	330,000	6,057	18.3	874	127
Total		9,873,448	197,332	20.		

Place.	Year.	Population.	Total Deaths.	Rate per 1,000.	Zymotic deaths.	Zymotic deaths per 1,000 from all causes.
Budapest	1888	442,787	13,726	30.9	1,581	116
Prague	“	295,837	8,664	30.2	2,147	245
Triest	“	156,042	4,199	28.8	582	136
Vienna	“	800,836	18,800	23.3	2,546	135
Antwerp	“	220,123	4,674	21.2	353	75
Brussels	“	462,069	9,758	21.1	504	52
Ghent	“	147,912	3,706	25.1	205	56
Liege	“	140,308	2,592	18.5	136	53
Copenhagen	“	300,000	6,299	20.9	1,080	180
Bordeaux	“	240,582	5,771	23.9	931	161
Lyons	“	401,930	8,617	21.2	903	105
Marseilles	“	376,143	10,881	28.8	2,153	197
Paris	“	2,260,945	47,341	21.0	7,360	156
Berlin	“	1,414,980	29,266	20.5	5,602	182
Breslau	“	333,471	7,262	21.8	1,195	151
Cologne	“	175,200	3,918	23.5	612	156
Dresden	“	259,142	5,224	20.2	813	155
Frankfort	“	164,000	3,053	18.6	288	95
Hamburg	“	543,670	13,159	25.2	2,523	192
Königsberg	“	156,441	4,042	25.8	860	212
Leipzig	“	181,324	3,275	18.1	516	156
Munich	“	275,000	7,454	27.1	1,889	253
Strasburg	“	115,780	2,785	24.1	625	224
Stuttgart	“	117,861	2,174	18.4	280	128
Birmingham	“	447,912	7,944	17.8	874	110
Bradford	“	229,721	3,924	17.1	364	93
Bristol	“	226,510	3,816	16.9	290	76
Hull	“	202,359	3,313	16.4	231	67
Leeds	“	351,210	7,209	21.1	945	131
Liverpool	“	599,738	12,159	20.3	1,796	139
London	“	4,282,921	78,848	18.5	10,803	137
Manchester	“	378,164	9,834	26.0	1,183	120
Newcastle	“	159,003	3,261	21.1	230	74
Nottingham	“	230,921	3,976	17.3	479	121
Salford	“	226,336	1,253	22.2	139	111
Sheffield	“	321,711	1,921	24.0	432	225
Aberdeen	“	119,334	2,179	18.3	193	89
Dundee	“	160,619	2,957	18.4	277	94
Edinburgh	“	262,733	4,736	18.0	451	100
Glasgow	“	526,088	11,675	22.2	1,529	131
Belfast	“	227,022	5,742	25.3	781	138
Cork	“	80,124	1,934	24.1	280	145
Dublin	“	353,082	8,894	24.5	983	112
Bologna	“	133,789	3,331	24.9	434	131
Milan	“	367,282	12,429	33.8	682	55
Rome	“	382,973	8,590	22.3	1,227	141
Turin	“	294,826	7,230	24.4	467	68
Venice	“	150,502	3,672	24.4	398	109
Amsterdam	“	390,016	8,070	21.0	619	77
Rotterdam	“	193,678	3,898	20.0	182	47
Hague	“	149,477	2,904	20.1	134	48
Christiania	“	136,900	2,784	20.3	786	282

PLACE.	Year.	Population.	Total Deaths.	Rate per 1,000.	Zymotic deaths.	Zymotic deaths per 1,000 from all causes.
Bucharest	"	206,000	5,047	24.5	1,010	200
Odessa	"	268,000	6,604	24.7	1,053	159
St. Petersburg	"	986,016	22,568	22.9	5,983	265
Warsaw	"	430,174	9,481	22.1	2,380	251
Madrid	"	480,000	17,942	35.3	2,174	121
Stockholm	"	221,549	3,806	17.2	797	209
Basle	"	73,963	1,232	16.6	188	153
Berne	"	50,220	1,162	23.0	101	87
Geneva	"	52,516	799	15.2	73	92
Totals		34,215,220	709,497	20.7		

From these tables it appears that the death-rate of twenty-six of the principal cities of America, with a population of 9,873,448, is 20 per 1,000. I think it morally certain that this rate could be reduced by means and methods now known to sanitary science to 16 per 1,000, and probably to still less than that. The death-rate for London for the year 1888 was 18.5 per 1,000. This can be still further reduced. That of New York and Brooklyn for the same year, taken together, is 25.5 per 1,000,—New York, 25.9; Brooklyn, 23.7. The death-rate of these two cities, if reduced to that of London, would secure a saving of 7 per 1,000, or, annually, 15,988 lives. These lives are public wealth.

But this is not all. For one death annually it has been estimated that two persons are sick during the entire year; or, in other words, there are two years of disabling sickness to one death;—31,976 years in New York and Brooklyn of sickness—preventable sickness. The cost of care and maintenance during sickness and convalescence, and the money value of the lives destroyed, considering them only as machines, will, in New York and Brooklyn, reach annually into the millions. I venture to suggest to the business men of these cities that this loss is enough every year to buy a great railroad, or to build and subsidize a fleet of ocean-going steel steamships. This is an annual waste of an immense amount of the best form of wealth of these great cities of our country. Shall it continue?

The sorrow of nearly 16,000 homes, the years of grief, and the 32,000 years annually of anxious watching and waiting over the sick-beds of those who finally recover, are not taken into this estimate. Such considerations do not, except spasmodically, move legislatures or executives. It is only as these touch property,—only as epidemics interrupt commerce,—that we are able to secure efficient legislation. I firmly believe that the death-rate of nearly all our large cities may be reduced three or four per 1,000 from the present rate. I am fully satisfied that this might be accomplished in our chief cities, and that sickness might be diminished in a corresponding degree.

This lengthening of years, this relief of distress, this saving of public wealth, is worth working for. What is true of the cities is to a great extent true of the rural districts. All over our broad land are farm-houses and small villages which become every year the seat of diseases that grow out of filth. Foul drains, foul water, badly constructed and ill-ventilated dwellings and school-houses are the causes of thousands of deaths every year—deaths that might be prevented by the application of acquired knowledge upon this subject. Sir James Paget, before the London Health Exhibition, discusses the problem of national health, and very conclusively shows that among the wage earners of England and Wales probably one fourth of the sickness is preventable. Of the 20,000,000 of weeks lost on account of sickness by about 15,000,000 of the population, one fourth, or 5,000,000 weeks, more than 95,000 years of work, might be saved. This estimate is based upon the population between fifteen and sixty-five years of age. The extension of this computation of preventable sickness to all ages in Great Britain and Ireland would present us with a most startling array of figures.

The mortality from typhoid fever in Illinois, during the year preceding June 1, 1880, was, according to the census reports, 2,432. It is estimated that the mortality from this disease is fifteen per cent. We must have had during that year, therefore, nearly 16,000 cases of typhoid fever. The 13,500 who recovered, assuming ten weeks as the duration of each case, were sick 135,000 weeks—2,417 years;—in all, living and dead, 160,000 weeks of labor and 2,432 deaths in this state in one year. It should be remembered that these cases were mostly adults, and, consequently, wage earners. The value in money of these 160,000 weeks of labor, nearly 3,000 years and 2,432 lives, I will not stop to compute.

There are other diseases producing disability and death which largely add to this enormous waste of life and of life's work.

It will be asked, perhaps, Why cite typhoid fever especially? I answer, that this disease, with many others due to filth, is a preventable disease. By the use of proper means its causes can be destroyed; and it is not chimerical to look forward to the day when typhoid fever shall be regarded as the evidence of disgraceful ignorance or of crime. Perhaps we ought to consider it so now, in view of the facts existing in some of the foreign cities, as in a portion of Vienna.

Up to the present time these problems of public health have received but little attention at the hands of statesmen. But it is no longer a question of possibilities; it is certain that this great saving of public wealth is within our reach. It may not be accomplished by methods hitherto used, but the result is possible by methods that are known, and which we know how to adopt. To do this, health officers must have not only the sympathy of the public, but they must have means and agencies to carry out the proper measures. If these are supplied, there will be no question as to the accomplishment of the result. It must be done just as governments wage war, a war of extermination of such diseases as these, as we seek to exterminate enemies with whom we cannot enter into treaties of peace.

What we want is a recognition of the evil, and a disposition to invest at least a very small percentage of the loss in money value of life and work—wasted life and work—for the purpose of preventing this waste, hardly more than would be paid for the insurance upon our public buildings, or upon our dwellings in proportion to the value of the buildings themselves.

While we are looking to the causes of disease and death about our own hearthstones, we are constantly reminded of the dangers from without. Along our southern borders a pestilence, which may very properly be called an arrow from Apollo's bow, threatens us yearly. It has, in its migrations, reached the Ohio and the Missouri, and along the Atlantic coast it yearly threatens the metropolis of the continent. Across the ocean Asiatic cholera is again approaching eastern Europe, and with the tide of emigration may very possibly again visit our own shores. These epidemics bring with them a fearful destruction of life. They strike terror into the stoutest hearts; but I think I am safe in saying that in every year, throughout the length and breadth of our great country, more men, women, and children lie down to die of diseases that may be prevented, than are carried off during any one visitation of yellow-fever or cholera. The causes of these deaths are subject to control, but it requires money and educated agents to check them. We legislate against the one, but we carelessly sit down and wait for the other to decimate our homes and to fill our cemeteries.

Society is a partnership; and, in the language of Burke, "As the ends of such a partnership cannot be obtained, in many generations it becomes a partnership not only between those who are living, but between those who are living, those who are dead, and those who are to be born." For "those who are to be born," then, as well as for ourselves, we should seek the largest measure of life and the best quality of its product.

We do not know with certainty how far life may be prolonged, but we are morally certain that it may be extended much beyond its present limits, and with a fair degree of usefulness. It is believed that its normal limit is about one hundred years. Instead of about forty years under the most favorable conditions, as at present, it is quite probable that sixty or more years should be attained by the best use of the means now known; that is, the average should be sixty or more years. It is not to be accomplished by doing those things that we have been doing. If it is to be reached, it is by doing greater things than we have done with the means now at our disposal. Eternal vigilance, and money, and work,—these are the price of the added years. With a better understanding and more faithful observance of health laws, forty additional years should be reached. This obedience to law, this adjustment of our surroundings and regulation of our whole being, mind and body, in accord with the conditions of physical, mental, and moral health, will prove to be the only true elixir of life.

It is an admitted fact that the most important and most efficient agent in the production of disease and death is filth. We seem to have devised the most ingenious ways and means for its accumulation and preservation. In our houses and cities all sorts of appliances are employed to preserve it from disturbance in the accomplishment of its function. We cover our floors with heavy carpets, in which it shall find a lodgment; we drape our rooms with heavy hangings; we cover our furniture with trappings especially designed to give it a refuge; we construct our rooms and arrange our conveniences with reference to the easy introduction of foul gases, and furnish all possible facilities for the propagation of disease germs. In our cities, we are oblivious of the immense accumulation of decaying organic matter that comes as the natural result of aggregations of population. Its very presence blinds our eyes, shuts our ears, and obscures our sense of mal-odors so that we fail to take cognizance of the presence of the offending and death-producing material. A writer says of the father of Cobden, that "Poverty oozed in upon him with a gentle swiftness, and ever after lay like a dull pall around him." So filth in myriad ways and forms gently but swiftly oozes in upon us. It invades our cities and our homes. It touches us so gently that we scarcely recognize its presence, but when once with us, it is likely ever after to remain, and, alas! too often it is transferred into the pall that covers the face of our dead.

Greater efforts should be made to remedy all this. The emanations from our manufactories should be reduced to a minimum. Our streets should be constructed of materials that do not decay. The surfaces of the streets should be kept clean. Our homes should not be converted into laboratories for the culture of disease-producing bacteria. The greatest problem, however, in large cities at least, is the disposal of garbage and sewage. All our expedients serve only for a time; our populations out-grow our mechanical devices. The economy of costly but efficient provision for these needs of all great cities has been but partly recognized. Where, however, contrivances by which the contents of the sewers are received and discharged at long distances from the centres of population, and by which garbage is destroyed or converted into inert products, have been adopted and thoroughly carried out, the result has been that, though as a rule the mortality of a city is increased somewhat in proportion to its population, the reverse may be secured. As an instance we may cite London, which is to-day among the most healthy cities of England, though it has also been illustrated in other places, so that there is no question about the fact that the mortality of a community may be reduced very much by these measures alone.

We have suggested the possibilities of increased length of life, of less distress, and consequently of much larger results of life's work. This realization will depend upon two factors—zeal on the part of scientific medicine, and intelligent coöperation on the part of the people. This coöperation will surely be brought about when the public shall come to believe that success will certainly attend the effort. The facts connected with this service will always present to the philanthropist the most pressing of motives, to the political economist the most weighty of problems. The end must be pursued as men work for wealth or fame, or other forms of power; as patriots, for home and fatherland; as Howard and Wilberforce and the noble army of martyrs have struggled for humanity. The work needs to be stimulated by the fierce heat of strong feeling, but, that it may be wisely done, it must be directed and controlled by the stern logic of statistics; by a careful study of aggregates, averages, and percentages. Means for its accomplishment must be furnished by society. The agents employed in its administration must for the most part be taken from non-medical men; lawyers, merchants, clergymen, mechanics, all classes of citizens, are interested in this service and must be induced to labor for it,—the men of medicine more than other men, only because they, more than other men, know the dangers, and the means by which these dangers may be averted.

The future is full of hope. Everywhere science with the microscope and the crucible is following the germs of disease and the agencies of death. Politicians even are beginning to think it worth while to preserve the lives of their constituents. The people everywhere are beginning to believe in the possibilities of something more potent than sackcloth and ashes to protect them from pestilence and the grave. Let us all work together, and we can do very much even now; and in doing what we now know how to do, we shall find out other ways to do still greater things. So shall we lengthen the cords and strengthen the stakes of the great tent of life, under which the cry of distress and the wail of bereavement shall become ever less and less, while in swelling chorus shall be heard through the ages the laughing of children, the sweet voices of young men and maidens, and the strong words of old men and matrons.

II.

ADDRESS.

By Dr. J. H. RAYMOND, of Brooklyn, N. Y.

Ladies and Gentlemen: We are met together to-night to extend a welcome to the American Public Health Association, which has honored our city in its selection as a place of meeting at this, its seventeenth annual gathering. This Association is composed of more than 600 members, representing every state and territory of the United States and every province of Canada. Among its members are physicians of both sexes and of every school of medicine, civil and sanitary engineers, clergymen and legislators,—in short, men and women who have at heart the welfare of mankind, and are striving to disseminate knowledge with a view to preserve health and lengthen life.

The history of civilization contains no brighter record than that which records the deeds of bravery of many of the members of this Association, their self-sacrifice and their devotion to their fellow-men. In the epidemics of pestilential disease which, at one time and another during the past fifty years and in a territory extending from the southern limit of Florida to the northern boundary of Canada, have devastated this continent, it is to these men that the fever-stricken victims have appealed for help, and to their honor be it said, that appeal has never been made in vain. While others have fled to escape contagion, they have remained, many of them to discharge their official duties, and many others with nothing to detain them, to voluntarily minister to the sick and the dying. The history of the cholera epidemic in our own and sister city, of small-pox in the various parts of our country and in Canada, and of yellow-fever at New Orleans, at Memphis, at Jacksonville, and at Decatur, is but the history of the members of this Association and their battle with disease. It is due largely to the members of this Association and its labors that almost every community in this broad land of ours enjoys a sense of security from pestilential disease; and they believe that if by any accident or oversight it should find an entrance, it would be met by a skilful, vigilant, and well equipped corps of sanitarians before whose attacks it must succumb. In honoring such an Association, therefore, we honor ourselves, and in a small and entirely inadequate way express our gratitude for what has been done for us and for posterity.

III.

ADDRESS.

By Hon. ALFRED C. CHAPIN, Mayor of Brooklyn, N. Y.

Mr. President, Gentlemen of the American Public Health Association, Ladies and Gentlemen: Undoubtedly the different duties that have been assigned during this session and during the sessions that are to come, of this Association, while it remains in the city, are none of them distasteful to those who have assumed them, but it seems to me that this pleasing and slight duty which has been assigned to me gives me something of an advantage over those who are to follow, for it is as simple as any that can be undertaken, and it has the advantage of not carrying with it any great burden of responsibility.

The American Public Health Association must feel sure, without special utterance to that effect, that it is most welcome here in the City of Brooklyn. I trust that fact has been made known to it, and will be made known to it, more thoroughly than can be done by any word spoken from this platform. Moreover, whether the duty of welcome, which I am now attempting to perform, be performed well or ill, makes no great difference, for the reason that another welcome is to be given by a gentleman of the medical profession who may be presumed to know precisely what sort of a welcome his own profession would most desire; so that there is no reason why I should feel uneasy as to whether you feel perfectly at home or not, after I have finished giving you this address of welcome, in addition to the other welcomes which you have doubtless already received, individually, in the various parts of the town.

Your Association has been meeting, as I am informed, for some years. It may be taken for granted that whenever it meets, as it must, in some particular place, it chooses that place for some special reason. It may be taken for granted, whenever you have met in any city or town, that you have been told that you had shown great discrimination, and that there was a peculiar propriety in your meeting at the particular place where you assembled. Now there are reasons why it is proper for you to meet in the city of Brooklyn. It might be proper for you to come here, if Brooklyn were the most unhealthy city in the world, because then our necessities would warrant it as an act of philanthropy and of enterprise. It might be proper for you to come here, if Brooklyn were the most healthful city in the world, for in such case your studies in the city would throw light upon those theories which you are attempting to enforce upon the practice of other communities.

If we were to be classified according to the condition of our public health, we should come nearer being the most healthful city in the nation, than to the other end of the line. That is an encouraging fact. I do not know that the fact can at once be accounted for. Perhaps the population of Brooklyn is, to some degree, of a peculiar description. Perhaps it has been carefully sifted out, and chosen from the other communities upon the face of the earth, and is fortunate in that respect. If that be the case, I do not know that your Association can establish the cause. That same condition could not be made to arise in other communities, because the people who are already born cannot be prevented from having had bad ancestors or parents, who have transmitted to them unfortunate constitutions. And, if it be true that the healthfulness of the inhabitants of the city of Brooklyn is due to the virtue of their ancestors, and to the solid stock from which they sprang, the most that can be said is, that this Public Health Association will do what it can to prevent the posterity of the American people from inheriting vices and tendencies which lead to deterioration.

Posterity is an interesting subject of contemplation always [laughter], and I assume that it must have been largely and studiously regarded by all bodies whose purposes like yours are preventive, because, if your purposes are fully carried out, they will not be seen in full fruition and most beneficial illustration until posterity appears upon the stage.

It was my privilege to give some attention to posterity when I first entered upon the duties of the office which gives me the pleasure of appearing before you. After some study of the city's affairs, I became apprehensive that unless something was done, the people of the next few generations might find their burden in life so light, and their pathway so rosy, so free from thorns, that there would be danger of their becoming unduly hilarious, reckless, and unworthy of their ancestors,—that is, of us, the present generation.

It seemed to me also to be my duty to suggest certain obligations and burdens which would fall due about the time the next generation was coming to maturity and was grappling with its duties. The performance of this duty, on my part, has made it reasonably certain that the next generation will be serious, not given up to such flippancy and frivolity as would be painful to those who intend to transmit to them this city of Brooklyn which we have built up. and must hand on along from generation to generation. It may be conceded, assumed, therefore, that some of the results of your deliberation will be such as to transmit to them a physical solidity, and a sobriety of temper and clearness of mind, which will enable them to grapple with the problems of their day as we have grappled with those of our day, and that they will not shirk them or push them off to some succeeding generation.

It seems to me that in welcoming you I may properly make one suggestion, if I understand the ends of your organization, and with that one suggestion I shall close the particular welcome which I have the honor of extending to you on behalf of the city.

You are a body of scientific men, and members, mainly, I assume, of the medical profession. The work for which you are associated together, although it is broad and comprehensive, and deserves all the eulogy that has been or will be said of it, is not all that is comprised in the field of the medical profession. Although the work of your body does not cover the whole ground of the medical profession, each one of you has undoubtedly set apart for himself some field that has a much smaller horizon than that of the Association; so that your Association, in its membership and in its collective purposes, and in the collective purposes of the profession to which it belongs, illustrates a truth which applies to every work of life at the present day, and which belongs to the general progress of all the community. That truth is, that as the interests of the whole community have grown to be so great and its functions to be so multitudinous, so each side or aspect of life demands a closer degree of study and attention than was needed in former times, and it is necessary now for each man to be more of a specialist than formerly, that is, to study some one thing a little more thoroughly; and it is also necessary that he should take a larger survey of the relation of his study to the whole progress of the art or profession in which he is engaged, or to the progress of the community of which it forms a part. There is an analogy between this double tendency or purpose that is proceeding within the ranks of your profession, and a sort of development that is proceeding in the community. We have arrived at the somewhat peculiar condition, in modern times, and especially in America, that government in general is growing constantly more and more broadly and widely popular in its basis, and rests more and more exclusively upon the single qualification of manhood. There is constantly more and more a tendency to broaden, to popularize the general functions of government, so that the government rests upon a great body of electors, who are in no sense specialists, or specially trained for fixed purposes in connection with the government. On the other hand, the government itself, based upon this broad and general principle, is constantly becoming more and more intricate, laborious, and delicate, and is constantly making stronger and more numerous demands upon the skill and art of men who have had special training; so that government, as an art, is becoming daily more and more elaborate, and at the same time, in its management, it is becoming more and more general and broad and popular. The manner in which the problem is to be met, in part, is of course suggested by the early existence of such an organization as yours. Government needs to be supplemented and to be aided by the community, and this fact has brought into existence such voluntary organizations as yours, that do supplement it, and which, by digesting thought and effort and labor, present to legislators and to administrative officers the established results of work, and enable the people, through their government, to appropriate and utilize those results for the common good. So that such an organization as yours may be said, in some of its aspects and phases at least, to be a political organization. To some extent it serves a political purpose.

Whatever you establish in any department is removed from the realm of hypothesis or controversy, and becomes incorporated in statutes; and it is true, as a matter of history, as one looks at the progress of sanitary study and at the history of such an organization as yours, he sees springing from it a class of legislative enactments and methods of administrative procedure based upon its suggestions and recommendations.

For that reason, in welcoming you, I will not merely content myself with the individual greeting that should come from one man to another, but, speaking as I am, in some degree, in a representative capacity for the municipality as well as for the individuals composing it, I would thank you for the valuable and humane political work that such an Association as yours is doing for the community at large, and especially for such communities as the city of Brooklyn, in which you are now assembled.

IV.

ADDRESS.

By Dr. ALEXANDER HUTCHINS, of Brooklyn, N. Y.

Members of the American Public Health Association, Ladies and Gentlemen: The felicitous and appreciative address to which we have just listened is significant. The occasion and the audience are noteworthy. A popular ovation to a body of learned men is not in the history of written books, but belongs to the present era. Learning and learned men have existed in all civilizations. Royal houses and men of wealth have been their patrons, and princes have presided at the inaugural of learned societies. The freedom of the city has been often given to individual men distinguished for their learning. Tyndall and Proctor and Stanley and Arnold have crowded this audience-room. But this is one of the rare occasions, if, indeed, it be not unique, when the community, in the person of its chief magistrate, throws open the gates of the city to a society of scientific men. And gracefully was it done. Fortunate the city the successive occupants of whose municipal chair, whatever their party lines or the entangling toils of political diplomacy, can still preserve unsoiled the sympathetic mantle of their scholarship. And when, coupled with this, facing this splendid audience, is a platform adorned by the presence of the eloquent and venerated apostle of the Pilgrims, and the ivy-wreathed head of New York's most ancient seat of learning, the medical profession in this city can well be content with the recognition of their distinguished guests.

And now, possessing the freedom of the city, not in the golden snuff-box, but in the salutations of the people, I am commissioned to lead you within the inner circle of our common duty. You are to be introduced to a body of medical men large in numbers, of accomplished learning, whose contributions to medical science and medical art have been commensurate with their great opportunities. You are to be welcomed to their scientific home, where are the no mean foundations of a medical library and files of medical periodical literature that compass the globe. You are invited to the inspection of a vast system of hospitals in this city, large in number, salubrious in location, whose service and equipment are unsurpassed. You are invited to the inspection of the detailed working of a health office, which through successive administrations has been managed with prudence and efficiency in the delicate and perplexing situations of a great municipality. You are invited to the lecture-rooms and museums of a medical college now far past its majority, whose earnest and skilful and faithful teaching has sent forth a large body of alumni honored throughout the land, and which has the prestige of having inaugurated what is now generally adopted, the closer union of didactic and clinical teaching. You are invited to visit a laboratory, elegant in architecture and amply equipped with all the appliances for original investigation in biological science, the wise and munificent gift of a member of this association. You are to be invited to the first great national exhibit of sanitary goods and appliances this country has ever seen, prepared in honor of this meeting by an indefatigable committee, which knew not the meaning of "rest" or "fail," the rehearsal of whose detail would be as interminable as it would be insufferable, but so large in variety, varied in design, aesthetic in form and finish, ingenious in device, suggestive of comfort in the various ills of life and of security amid the complicated dangers of our social order, and so variously adapted to the multitudinous needs of all conceivable forms of remedial and sanitary appliance, from the literature of babyhood to the furnaces for cremation, that the ruddy tint on the boyish cheek of Health itself takes on a deeper carmine of regret that life is too short for any one person to have ills enough or to be sick long enough to take them all in or try them all on. And finally, in the intervals of your various duties, you are to be invited to our homes, where our wives and sweethearts, the loveliest in the land, stand at the open portals of our hospitality to give you their greeting. When you come to know, if you do not already know, the weight of metal of these Brooklyn men, and then let your imagination run riot over the power of that magic that has fused them into subjection, in the quiet evenings of your far-away homes, you will recall with mingled emotions this evening spent in the very amphitheatre of that thraldom. [Applause.]

Fortunate for you if this Association shall prove a veritable Ulysses, that can stop its ears against the song of the sirens, as it drifts its slow four days voyage past this Calypso isle. I have not the temerity to suppose that any words of mine can adequately express the enthusiasm with which your coming has been hailed, or the strong expectation of the impetus to be given by your coming to our scientific activity. I can only ask you, putting aside the ineffectiveness of the speaker's words, to raise your eyes, not to the meridian sunlight of the welcome that the hours will show apace, but only to the far-away mountain-tops just catching the first dawning of the welcome of your Brooklyn friends.

The medical profession of this city salute you, because what is embodied in this Association is not only an emphasis of the relation between medical science and the state, but because this Association represents in itself the latest outcome of medical science. It is a uniform fact, that at various periods along our history the writers therein have denied to the medical profession any medical science: it is uncertain, inchoate, tentative, experimental, anything but scientific. I suppose it is possible for a man to live comfortably and die happy without being a scientist, though this, in the opinion of some enthusiastic scientists, would be considered a debatable proposition. Nevertheless, we can say to our literary friends that their denial of the science is but a criticism upon the necessary limitations of the art.

Prophylactic medicine, if a generous audience will excuse a phrase that has no equivalent in the language, has existed from all times, in all the written work of medical literature. It has reference to the individual, and to the control of the spread of disease already existing. When, in the process of things, medical science had evolved the doctrine of preventable disease, medical science pronounced that such preventable disease must be prevented; and hence the new phrase came into medical literature of "preventive medicine." When it was found that not all the information that the medical scientists could give could have any influence whatever in the moral control of people to do as they ought to do in reference to each other, then it became necessary for the state to interfere, in order that there might be governmental control of the health of the community, and then a newer phrase came into literature, called "State medicine and public health legislation."

It is unquestionably true that in the history of nations, remote and near, there have been at times attempts made toward controlling conditions that generated disease, but, so far as history teaches us, those attempts at control have been solely with relation to the privileged and upper classes of society. The lower classes and the poor were left entirely out of account by belligerent and paternal governments. Nothing in the Roman state organized for aggression and defence,—nothing in the government of Louis XIV, who said the state was himself,—had anything comparable to the condition of affairs at the present day. This condition has been derived from the teachings of Christianity; and the Christian state develops the fact that the brotherhood of man and the mutual dependence of the various members of the community, are essential to a sound organization. What we understand as public health legislation came in for humane purposes. This Association (and its similars throughout the civilized world) assumes the role of educator. Legislation, in advance of public opinion, is likely to be oppressive and is sure to be offensive. Public health legislation is an illustration of this fact.

This Association as an educator cannot stop with an appeal to the privileged classes and cultured people of the community. The era of the London Plague, and from Elizabeth to the Charleses, was certainly a learned age. It was the age of Raleigh and Ben Jonson and Shakespeare, who wrote imperishably, and of Sir Christopher Wren, who built palaces and cathedrals that are outliving the centuries. But in the age of the Plague, London had few highways, and refuse and excrement were piled roof high over against the cabins of the poor, over and around which one hundred and fifty thousand poor and pestilence-stricken subjects of four consecutive august and most Christian majesties crawled to the sunlight or were dragged to the trenches. If all that belongs to sanitary legislation and ordinance in this city to-day was withdrawn, Brooklyn, in all its glory, would soon lapse into the condition of the London of the sixteenth century.

The papers of Mr. Kennan, that have been read so largely in this country during the last two years, describing the terrible condition of Siberian prison life, have shocked the community, though it has not been surprised at the inhumanity of the military despotism of Russia. And yet, England, one hundred years ago, had no beds in her prisons or in her mad-houses. This whole matter in which you are interested is extremely young. It is only fifty-two years since Doctor Farr published his first report on Vital Statistics. It is only twenty-four years since the first attempt at public health legislation was begun in this country in the state of New York. It is only fourteen years ago that England consolidated her Health Acts. It is only ten years since the National Board of Health was established, and this Association has not reached its majority. Surely, in spite of the Ægyptologists, this world is very young, or else your feet are on the threshold of the millennium. This Association, in point of time, is but in its swaddling-clothes; in point of efficiency, based upon the garnered history of its fathers, it is a Minerva sprung full panoplied from the head of Jove, and the sign of Jupiter is the heraldic crest at the head of every prescription written by medical art for the amelioration of the race.

Both the discoverers and the early missionaries to the Sandwich Islands agree in the statement that these people were almost unique as an example of perfect health, in spite of certain cannibalistic and polygamous tendencies. Their life was a simple one; their relation to each other was simple, kindly, and gentle. Perfect health and simple ways beget gentle speech. Their language was simple, and so in their gentle speech they had a form of salutation which is a gem in its tenderness. In the ordinary meeting along the roadway, as perfect strangers, the expression used was "Aloha!"—"I love you." Among those who were on even terms of position and labor, it was "Aloha nui!"—"I love you more." To those who had been victors, or occupied the position of influence or power among them, or who had rendered special service to the tribe, it was "Aloha nui loa!"—"I love you more and more."

And so, on behalf of my brethren, I bring you, freighted with the weightier message of this later era from the far-away days of that simple life on those breezy isles under tropical suns, this salutation,—because you are guests at our hearthstone, Aloha; because you are brethren of a common heritage, doing a common work, Aloha nui; because your unselfish and laborious ambition is for the betterment of the race, Aloha nui loa. [Applause.]

V.

ADDRESS.

By Hon. SETH LOW, of Brooklyn, N. Y.

Mr. Chairman, Mr. Mayor, Ladies and Gentlemen: During my recent visit to the West it was my good fortune to become acquainted with certain gradations of labor which up to that time had not attracted my attention. I allude to a good wife who called her husband to come to her; he replied that he could not, that he was busy. Her reply to this statement was, "What are you doing,—standing thinking?" and his reply was, "No, sitting talking." I can say that I have been busy in both of these engrossing occupations of late, so busy that I hope you will expect of me at this late hour of the evening only a few words which have been suggested by what I have listened to here, and the few words that shall say to you how greatly I value this meeting of the American Public Health Association in our good city of Brooklyn.

The first thing I feel constrained to say, sir, and I regret to say it, is to warn the Association, as witnessed by this large audience, that they have come into a most unsympathetic community. The basis upon which I make that statement is an argument presented to us by Mark Twain, of Hartford. I have not been long enough in the new position to which I have recently been called to be entirely confident of its conclusiveness; at the same time here it is. He said that he did not believe in doctors; that all his great grandparents believed in doctors, and there was not one of them living! I presume from that circumstance that the presence of so many living Brooklynites to greet you here is a demonstration of the lack of sympathy with the medical profession which prevails in this benighted town.

Having cleared your minds upon that point, I think, before I finally sink into the collegian, I may be permitted to say a single word in the domain of politics; to point out to the president of this Association, that the only difficulty which he has, or will have, in enlisting our Brooklyn politicians in the purposes of this Association, is the fearful uncertainty prevailing in their minds whether, in attempting to save the lives of their own constituents, they shall not also be preserving the lives of their antagonists. If the Public Health Association can satisfy our politicians on that point, I think I can promise for them hearty coöperation.

I listened with a great deal of interest to what was said of this health exhibition. I noticed that among the phenomena, or objects, perhaps I ought to say, which await those who visit it, were specimens of plumbing. I have not yet seen it, but I venture to think that the specimens of plumbing which you will see there, are specimens of such plumbing as are usually presented to the eye. What I wish we could see there, because it would be the most significant object-lesson that this community ever saw, are the specimens of plumbing that have actually been taken out of homes in this city, homes that have been desolated because the work that was hidden from the eye was unfaithfully and badly done.

This city of Brooklyn, it seems to me, is approaching a new problem on its sanitary side, and I welcome you as one whose interest will always remain with this city, no matter where I may chance to live [applause], and for the light that may be thrown upon this problem I welcome the meeting in Brooklyn of the American Public Health Association at this time. Until within a very few years the entire population of Brooklyn has lived upon the highlands, sloping down towards the bay, and we have had almost the best position of any city in the country for the drainage of that which must be taken away out of the reach of the city. We have had sufficient fall of the land for our sewers, and they have reached the deep water where the tide is rapid and the water so abundant that the sewage does little, if any, harm. But now Brooklyn is extending over the island to the eastward, just as the population of our country is spreading over the prairies, and it has come to a point where the fall of the land towards the sea is almost imperceptible, and where our sewage, if taken to tide-water, will reach, not the ocean, but land-locked salt water bays. I submit to the intelligence of this community and of this Association, that a very different problem of sewerage is presented to Brooklyn now, with our population extending, as I have said, to the lowlands beyond the reach of the hills.

I noticed with great pleasure that one of the papers to be read here deals with this very question of the disposal of sewage. When I was in Paris I visited the sewage farm, and there I saw water, that had come directly from the sewers of Paris, led in trenches through the ground till it floated into the Seine, as white as crystal, and I suppose as pure. Certainly I was invited to take a drink. Now, I have read that in the southern part of France they have had repeated epidemics of fever, and one disease and another, because the liquid sewage was sprinkled over the lettuce and other vegetables, and fell actually upon the leaves of the plant. But I believe it is not so in reference to the sewage farm near Paris. The vegetables grown there are undoubtedly used, and I did not myself learn that any harm came from that disposal of sewage. But there the sewage does not touch the plants. I do hope that this Health Association will discuss this question here in Brooklyn, for it concerns us mightily whether there is any use to which this waste matter can be put that shall save us not only from disease, but from immense expense. Such use, it seems to me, ought to be within our reach, for I think of no characteristic of our day more remarkable and noteworthy than that which makes useful products out of what would a few years ago have been waste products. In my mercantile career I handled a great deal of raw silk, and in the early part of my business training, all of the cocoons out of which the moth came were thrown away; they were known as "pierced cocoons," because the grub, in coming out of the chrysalis within the cocoon, had cut the threads and they were valueless. But within a few years it has been found that these pierced cocoons can be spun into a thread precisely as well as wool; and that material which for centuries had been thrown away as valueless, now adorns the fairest women that we know.

So it seems to me, as to this waste matter which gives us so much trouble when we attempt to part with it from our sewers, that it ought to be within the power of an association like this, sooner or later, to point out to the cities how it may be converted into something valuable and healthful to our city life.

These are only a few of the reasons why I welcome this meeting in this city. I want to point out just one, finally, which the people of Brooklyn will appreciate, I am sure, if the members of the Association do not so much. We are in the habit of saying that Brooklyn is a part of the metropolitan community, and so it is. But the point I want to impress upon you is, that it is more than that—that it has an individual life and character of its own; and I welcome with profound happiness the gathering of such bodies as this in Brooklyn, these national bodies that indicate that Brooklyn is coming to its right mind, and purposes to take her stand as an individual among the great cities of this land. I remember saying a few years ago to a director of our Ferry company, who was complaining that the bridge receipts had reduced the income of the ferries 33 per cent., "What difference does that make to you? That is a loss of one third, and you say that you can no longer make money. When Brooklyn had one third fewer people, you made money and were happy: why can you not do it now?" His answer was so significant that I give it to you. He said,—"It is my observation that a much smaller proportion of the population of Brooklyn crosses the river daily than in former years;" or, to put it better on the positive side, a much larger proportion of the population of Brooklyn spend their days now, and find their occupation and living, in this city. [Applause.] The manufacturing interests have grown here, and keep men and women continually here; the shop interests have developed with the growth of a permanent population that is peculiar to Brooklyn. And, therefore, this awakening to a local life is really the result of a long process, which has been growing unnoticed, and which we are just now beginning to realize for what it really means. I am thoroughly glad that this American Public Health Association has met here in the city, not only for what it can do for us in the immediate line of its work, but for what it means to Brooklyn, or ought to mean,—that Brooklyn has an individual life that she ought to emphasize on every occasion and in every possible way. [Applause.]

VI.

ADDRESS.

By Rev. RICHARD S. STORRS, D. D., of Brooklyn, N. Y.

Ladies and Gentlemen: At the close of this extremely interesting and able address to which we have listened, it seems hardly worth while to add anything. I am very glad to offer my word of welcome, however, uniting it with that of my fellow-citizens, to this Health Association, which does us the honor to come to us this year. I know of no reason why a minister of the gospel should not speak such a word of welcome. Health and holiness, as words, come from very much the same root; and they both really signify much the same thing, that is, wholeness,—of body, that is health; or of soul, that is holiness. In our strictly limited sense of the term, therefore, the physician and the minister ought always to work together and to regard each other as brothers, as they usually do. My relations of personal acquaintance and of intimate friendship with physicians have been as close and as delightful, in the city, as with any other class in the entire community, though the other class be of clergymen and these of my own communion. I remember no face more vividly, as I look back upon the past, than the clear, eager, beautiful face of him who was so well known and honored in the Medical Society of this county for so many years—my friend of many years; the public-spirited citizen, the devoted friend, the earnest Christian, enthusiastic in the pursuit of his profession and in the performance of all its duties; the most capable, most faithful, most careful, and most efficient physician, Dr. Chauncey L. Mitchell. He has gone up to the higher realms. Among those whom I have known and honored here have been other physicians, with the same spirit and the same characteristics, and doing their work in the same temper of faithful consecration.

I have always felt that there was one element in medical acquirement which has not been specially referred to, though it has been illustrated by those who have possessed it. That is the element of Character, as illustrated in him of whom I have spoken, and in so many others. This element of character in the physician impresses itself upon the patient, and gives an efficacy to remedies which otherwise they would not have. I remember a physician here, who died years ago (I will not mention his name, but many of you certainly knew him), a very large man, two or three inches, I should think, taller than I am, large in proportion, with a large voice, and with a fist like a granite boulder. I never saw that man putting his hand on the pulse of a little baby, or of a delicate lady, without being reminded of a stalwart blacksmith undertaking with a sledge hammer to mend a porcelain vase. The druggists must have been delighted with him, for I do not believe he ever gave less than a quart of anything. [Laughter.] But he had such a cheery way, that when he came into a house his presence brought exhilaration into the whole house. It reminded me always of what I have often felt at the seaside, at Shelter Island. After a sultry day there comes in a strong north-west wind : the whole atmosphere is changed. And so it was changed in the house when this dear and honored man used to enter it to minister to the sick.

Character is a great power. Yet, I do not at all underestimate, of course, the skill and science to which later time seems to be continually giving fresh attention. I recollect a good many years ago a distinction was wont to be drawn between the American or the English mind and the German or the French scientific mind, somewhat on these lines,—that the English or the American mind was, perhaps, more rapid in induction, more fruitful in suggestion, and not wanting in sound sagacity ; but that for minute analysis, for the comparison and development of results, for protracted and more careful examination of facts, the French or the German mind was probably superior. I do not know how that may have been,—but since the physicians of the land, young and old, have begun to use the microscope so continually, and to count and individualize the millions of bacteria that get into a cubic inch of air or of water without crowding one another, and to identify the bad microbe (if that be the name) from which come lung fever and typhus fever and everything else,—I think minuteness of analysis has gone about as far as it need to go in your profession. And certainly, in the intercommunication of nation with nation, any result of the continental mind, French or German, is known in London or New York as soon as it is in Vienna or Berlin or Paris ; so that, continually the American mind is becoming stored with the results of the most minute and careful analyses and investigations by the Continental observers. I count that a great blessing to our own medical people, to our own people at large. The American professional mind, too, is becoming solar instead of lunar, as it used to be. It used to be a pallid reflection of light emanating from other sources, but now it gives light itself, as from a luminiferous centre. I suppose as critical operations are performed in this country as anywhere in the world ; that as marvellous discoveries have been made here as anywhere in the world. Chloroform was discovered here, sixty years ago, by Dr. Guthrie, of Sackett's Harbor ; the production of anaesthesia by ether was discovered in Boston in 1846—I may say the most important discovery in the world in the last fifty years—giving to the surgeon untold liberty in the matter of operation, and relieving the patient from that extremity of pain which made some operations before almost certainly fatal. These are American discoveries ; and others are going on all the time. The majority of medical text-books in use in our professional schools and our professional libraries I take to be now of American authorship. A professional enthusiasm has arisen. I find no enthusiasm in the young artist, or the young professor, or the young clergyman, surpassing the enthusiasm of the young student in the domain of medicine, and in the discoveries which make its progress illustrious. In your remarkable sanitary exhibition you show us furnaces and ice-freezers, sanitary plumbing arrangements, with the health lift and the gymnastic apparatus, with the sanitary woollen goods and the sanitary corsets, and I don't know what other forms of equipment, and with drugs enough, all warranted chemically pure, and sufficient in quantity to kill or cure all the sick whales in the Atlantic ocean.

There is a great satisfaction to me in the fact that when you have made a scientific discovery, it is a fixed fact. A man thinks he makes a discovery in history, perhaps, and it may turn out to be an illusion; and sometimes also in speculative philosophy. I have known two or three such in my life in theology. But if a man find a scientific fact, there it is, permanent. It is like the beautiful stone-work in the palaces in Europe, the *pietra dura*, vivid in color as any glass in the cathedral window, as any canvas on which the hand of the painter has strewn its light—vivid in color, and, also, everlasting. So a scientific discovery, once made, takes its place with other discoveries, and endures for all time.

Now, Gentlemen of this Association, we are glad to welcome you to Brooklyn. It is a young city, and it has a young mayor. [Applause.] And it has a host of young men and young women in it who will welcome you to its homes, its churches, its schools, its libraries; and, as I happen to be president of the Historical Society here, I welcome you on behalf of the directors of that society to its library, where you may trace the history of the world, and trace your own genealogy back, if you wish, to the gentleman who just came after Adam.

We are a young city, and some people think we have grown too fast for our strength—from 60,000 to 850,000 in my time. And we have a big brother across the river, who says (and there is some truth in it) that we were not really able to walk alone until we got the bridge. He makes more noise in the world than we do, because he is older; but we never get really angry with him, except when he comes and steals one of our pets, like Mr. Low. [Applause.] Then we feel a righteous indignation, and want to thresh him. But we have a good constitution, we have good health, we have a good deal of vigor in our veins. Though we are subject, perhaps, as a city, to the common children's diseases, such as measles, mumps, winter colds, summer rash, and things of that kind, we expect to live a good many hundred years. If the proper term of human life be seventy years, I suppose the proper term of city life must be about a thousand; and if that be the fact, then, on that scale, this city is now about five years old, a baby still, but going to be bigger than New York, as all the world already knows that it is vastly better.

But we want you to find out some of the things in regard to which you have intimated something to-night. We want to know how it is that this dark, sly demon of diphtheria creeps into our most carefully fitted and furnished homes, equipped with every possible appliance for keeping out filth, and leaves the tenement houses and gutters and cellars untouched. It begins to look, sometimes, as if dirt were wholesome, as if filthy surroundings were a condition of vigor. We want to know why it is that this autumnal swoop of typhoid fever comes upon us every year, while we have the purest water in the world, and all the sanitary appliances that we know of in our houses and along our streets. We want to know how it is possible, if we can, to diminish the number of these infinitesimal microbes, of which we are told that we inhale so many thousands with every breath, and drink, I do n't know how many thousands, with every glassful of water. Tell us these things, and then we shall not want any elixir of life; we shall live long enough! Dr. Lyman Beecher once preached a superb sermon, after which some one said to him, "I hope, Dr. Beecher, that you will live forever!" "Well, I expect to," said he, "do n't you?" We do expect to live forever, but we do not expect to live forever on the earth. We shall live long enough, if you, with your sanitary investigations, will only teach us how to grapple with these enemies of our peace. The elephantiasis of the Middle Ages has been obliterated and stamped out; the black plague has been obliterated and stamped out; you have taken Asiatic cholera by the throat and hurled it back from our shores. Now, take these things all around us, and tell us how we may destroy them. Then we shall have reason to rejoice as long as we live, and to rejoice hereafter, too.

In your having come to us, and having instructed us, that word of Dr. Beecher's again suggests itself. Men have always been apprehensive that there was going to be some quarrel between the scientists on the one side and Christian thinkers on the other. It is the most absurd apprehension that ever entered the human mind, I think. Science puts emphasis on the question, Whence? Religion puts emphasis on the question, Whither? Science treats of the origins; the gospel treats of the consummations, and of consummations that reach beyond this present sphere. So long as the physical world on the one hand, and the spiritual world on the other, both came from one ordaining Mind, the one will never conflict with the other, though, until sufficient fresh light is thrown upon it, men's conceptions of the one or of the other may be imperfect. But there will surely come a time when their conceptions will flash together into perfect and immortal harmony, as they see the whole inter-related and unified system in the city of God, and in the vision of God's face!

VII.

THE OVERSHADING OF OUR HOMES.

By WM. THORNTON PARKER, M.D., Newport, R. I.

In searching for information in preparing this paper as a protest against the overshading of our homes in towns and villages, I am surprised to find that so very little has been written on this important subject.

Dr. Vaughan's admirable essay, published by the American Public Health Association ("Healthy Homes and Foods for the Working Classes"), sums up in a few words of caution the dangers from damp soil and insufficient sunlight; but it seems to me that more particular attention should be directed toward the value of sanitary details in the surroundings of our homes.

The duties of the medical profession are mostly confined to the relief of immediate suffering and disease. The surgeon and the physician are actively engaged in the effort to save from impending death; and advice concerning hygiene is by no means so frequently sought as it should be, although a great improvement in this respect is very noticeable. The labors of hygienists and sanitarians are being more and more appreciated by the public, and the great work of the American Public Health Association and of our state and local boards of health is doing incalculable good for the nation, and increasing health and comfort and length of life. Sanitary science has robbed disease of much of its strength and terror. The great work accomplished may not have received the commendation it has deserved, but it is, nevertheless, a comforting fact for those who have toiled for the public good that a certain amount of success has attended their unselfish efforts. The study of sanitary science and the faithful discharge of the duties we owe to the public at large are never lost sight of by the medical profession; and when we consider that most of this advice and labor is a gratuitous gift to the people of the communities in which they live, and that often ridicule and blame are the only return for it all, we have a right to feel that our profession is a noble one, and our calling worthy of our most faithful efforts.

The sanitary surroundings of our homes, where our families live and are reared, ought to be as nearly perfect as it is possible to make them. The grounds should be well graded, drained, and free from stagnant water, and sufficiently dry and wholesome; and trees and bushes should be well thinned out, lest they be the means of preventing the free access of sunlight, without abundance of which no family can be either truly healthy or happy. Every bed-chamber must, if possible, be so situated that abundance of sunlight can enter it for some hours daily, in clear weather; and especially is this true of the nursery, where the greatest amount of sunshine is needed, and where its life- and health-giving rays will most surely make its value recognized in cheerful dispositions and in healthy bodies.

[1] The considerable increase of numbers means always war upon those pristine conditions of purity which exist in the elements before man's interference upsets the regulating and well balanced alchemy of nature.

[2] Men are so accustomed to look upon disease as an unavoidable evil, that the idea of preventing it by any means of their own seems to have never distinctly occurred to them until within comparatively modern times. Preventive medicine, as it has been called, is one of those things that are theoretically approved and too often practically neglected. No one doubts its importance.

[3]An important difference between men and animals is found in the extent to which man will sacrifice a present pleasure or convenience to secure a future good or to avoid a future evil. This is especially the case as regards matters affecting health. When a man begins to take special precautions as to his diet and exercise, having in view rather his future health than his present comfort or tastes, he has in most cases already begun to suffer from the effects of his imprudence, and does not commence a hygienic course of life as a perfectly sound and healthy person. The same is true for a community. It will not usually submit to the burden of taxation necessary to secure needed reforms until the neglect of these things has resulted in such an amount of disease and death as forcibly to call attention to the matter. The result is, that the burden is far heavier than it would have been had the work been undertaken in proper season. When a state or municipality has so far advanced in civilization as to consider it desirable to take measures to protect the public health by preventing individuals from polluting the air or water liable to be used by their neighbors, the services of the medical profession are usually called upon.

This subject is one of national importance, and concerns not only the prosperity of the people in a pecuniary sense, but is of greater importance in relation to sanitary matters and the general protection of health. Concerning the preservation of our forests it would be difficult to write too much; and everywhere there should be a desire to preserve and protect them. We are witnesses this year of the terrible calamities resulting from the wholesale destruction of our forests; but perhaps we do not sufficiently consider that the general climate suffers from this cause, and that indirectly much of disease and death results from the wanton destruction of the trees, so essential in the general condition of healthful landscape. It has been hoped that the government would make some practical efforts to protect the forests.

For many years our people have given considerable attention to this subject of forest culture, but instead of exercising their influence in the direction of forest protection and increase where it is most needed, many seem to content themselves with planning "arbor days," and employing our school-children in planting trees and shrubs in parks and school grounds and streets of our cities and towns. To witness the faithful efforts of our children as they plant the trees where sunlight is most needed, one cannot help feeling that oftentimes these efforts are sadly misdirected, and that the theory taught is not the true one. This love for the beauty of foliage is right, and it is natural, and, properly guided, is to be encouraged, but it has undoubtedly been only too often extravagantly bestowed; and the societies formed for this purpose are not always under the direction of the wisest, and the planting from a sanitary point of view has not yet received much attention. To set out as many trees as possible seems to be the object, and this is limited only by the means and the amount of land at their disposal. The poem, "Woodman, spare that tree," has won a strong place in the hearts of the people; and while whole forests disappear as if by magic, in ruthless waste and in serious menace of health and life, the tree in the town, whose roots are bathed in poisonous soil, and whose branches are filled with deadly vapors, and whose leaves repel God's glorious sunshine, stands triumphantly, a delusive ornament and a dangerous menace. So much has this natural love for the beauty of foliage been misdirected, that many sicken and die from overshading, even as many must also suffer from the wanton destruction of our forests.

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[1] Dr. Ames's "Some Sanitary Problems of Massachusetts." Boston. *Medical and Sanitary Journal*, July 6, 1882.

[2] Dr. Tracy in Ziemssen's Cyclopedia of Medicine, vol. xix, p. 573.

[3] Pepper's System of Medicine.

Where the grounds about our country houses are extensive, the luxury of shade-trees can be indulged in; but healthy shade without perfect ventilation and circulation of air is impossible. The soil, to be fit for man to live upon, must have the rays of the sun to bathe it, and the fresh warm air to come in contact with it. A soil, damp and overshadowed to such an extent that the sun never reaches it, is unfit for a play-ground for our children, or as a retreat for adults: indeed, such a place is a veritable death-trap for many infants and weakly persons, both in summer and in winter. Such soil surrounding human habitations is most unsuitable, and is always a menace to health and life. Every physician has had an opportunity to express his disapproval of yards, undoubtedly unhealthy for strong men, yet offered to the sick as a place where they may hope to obtain air and gain strength.

From the Atlantic to the Pacific, from our lake towns to the homes upon the gulf,—go where you will, it is universally noticeable that our towns are dangerously overshaded. As one who has spent months in the camp, or in the open life of a military campaign, suffers seriously upon moving into barracks or houses, and feels as if he could not breathe the foul, close air of our homes, as we commonly find them, so one who lives in some open country resort, new and comparatively free from shade, is aware of the unhealthy closeness of the air as he enters the overshaded streets of an American town or village. I experienced this very perceptibly myself recently on a visit to a famous summer resort, suffering severely from the close, unhealthy air of overshaded streets to such an extent that I could hardly articulate a word, so great was the injury to throat and air passages from the effects of the stifling air; and all this was owing to the neglect of man. Nature had given the locality an atmosphere and climate unequalled on this continent in many respects, but man had jeopardized it all by the heedless planting of trees, resulting in overshading and consequent injury not only to houses and lands, but also seriously threatening the lives of the inhabitants of an otherwise natural health resort.

The past nine months of this eventful year of 1889 have been remarkable in the lessons they have furnished for sanitarians and hygienists. As might well have been expected, the past ten or twelve weeks have furnished a large death-rate from causes preventible, which must act as a warning for all who are interested in the welfare of the country. I do not hesitate to affirm that this death-rate is owing to the overshading of our homes, in very many instances. Each community has its proportionate share of value in health and homes. Whatever diminishes this value is a direct injury to that community.

Overshading is a serious fault, and directly lessens the value of real estate, and noticeably increases disease and shortens life. These facts should receive careful and positive attention.

Vegetation produces a great effect upon the movement of the air. Its velocity is checked; and sometimes, in thick clusters of trees or underwood, the air is almost stagnant. If moist and decaying vegetation be a coincident condition of such stagnation, the most fatal forms of malarious diseases are produced. A moist soil is cold, and is generally believed to predispose to rheumatism, catarrh, and neuralgia. It is a matter of general experience that most persons feel healthier on a dry soil. In some way, which is not clear, a moist soil produces an unfavorable effect upon the lungs. A moist soil influences greatly the development of the agent, whatever it may be, which causes the paroxysmal fevers. In ground which has been rendered dryer by drainage, Buchanan[1] has shown that there has been a diminution in deaths from phthisis.

Houses overshaded are not healthful, no matter how commodious or well built they may be. Too many trees near sleeping- and living-rooms exercise a very injurious influence, and induce various diseases, notably rheumatism, heart disease, consumption, general debility, and anaemia. It would seem as if these truths must be too well known to need any statement, and undoubtedly the members of this Association, at least, have long been familiar with the evils I am endeavoring to picture. But it has seemed to me, in view of the increasing foliage of our towns, necessary to call them again to your remembrance, and to ask you to consider the whole subject as one well worthy the attention of those interested in American public health. A journey through many of our towns during the past nine months, and an experience covering twenty years of professional investigation, have convinced me that this most undesirable condition of overshading is only too common, and has become a positive injury in almost every direction. The bad results are, in point of fact, much more serious than most people seem to be aware of; indeed, the ignorance or indifference generally noticeable is deplorable whenever sanitarians make a move in the interests of public health.

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[1] Parkes Hygiene, vol. 1, p. 351, *et seq.*

A soil loaded with roots and densely shaded is unfit for man to live upon constantly, and is certainly no place for a permanent home. The air entering the bed-rooms and living-rooms from such surroundings is chilly and dead, and is not at all suitable for respiration. Such an atmosphere cannot bring health to invalids, and is dangerous to the well. It is invariably productive of sickness, and even death, especially among children and those of feeble constitutions.

This condition of overshading is very noticeable in our New England and Middle States towns; indeed, it is to be found everywhere in our land. In New Mexico, Colorado, and Kansas, where trees grow only after considerable attention and care from those who would have them, and where often expense and tiresome labor must be given to rear them, even there one finds the houses seriously overshaded. The climate is indeed health-giving, and nature affords everything desirable, and the atmosphere is pure and strengthening; but man, dissatisfied and complaining, or actuated by mistaken notions of health, at once attempts to hide his home by the densest shade possible, thereby cutting off the supply of pure air, and hiding his house and his family from the life-giving sunshine. It is, of course, in many instances desirable to interpose trees as a barrier against prevailing winds, and as a means of affording shelter against cold; but too often the trees are placed so close to the house that the good which is sought is overbalanced by the injury attained. The earth, which is found in a healthful condition of virgin purity of soil, he loads with impurities, and, having prevented the disinfection of these unsanitary surroundings by pure fresh air and sunlight, soon berates the new climate for the inevitable sickness and death which must soon follow from conditions so unfavorable.

To those of us who are used to the scorching sun of our Western deserts, a healthful, pleasant shade is worthy the poet's song, and is indeed a pleasure highly appreciated; but how much to be preferred the scorching sun of the prairies, than the damp, dead atmosphere to be found in so many of our Eastern yards!

The white faces and sickly appearance of so many of our people,—men, women, and children,—are largely attributable to overshading, and suggest that medical men should call attention to the growing evil—overshading.

The axe would be a great benefactor if freely used about countless thousands of our overshaded homes. We are all personally acquainted with many such places. It would be well for the public if medical men would bear this in mind, and govern themselves accordingly, frankly stating to their patients, in assuming the professional care of the sick, that improvement will be much more reasonably anticipated when some of the superfluous trees in the yard of the house, or in the immediate vicinity, have been removed. Trees preventing the incoming of God's sunshine, which He in His wisdom has given us for our health and life, should be cut down and carried away; and the soil would then be allowed some chance to dry, or, as one might say, "to breathe." The earth, to be healthy, needs, just as the animal needs, the warm, dry air and life-giving rays of the sun.

As man pales, sickens, and dies without the blessing of the sunshine, so, too, the earth deteriorates and becomes unfit as a safe resting-place for man, if it is deprived of the requirements of nature. It frequently happens that physicians are called to prescribe for ailing people who seem to possess every comfort and luxury, and yet who are really perishing because their houses and grounds are overshaded. The people who live in such houses are always cold and miserable, needing extra clothing, and expending great quantities of fuel in order to obtain the needed warmth and to dispel the deadly chill. Artificial heat can never be compared, reasonably, with the pure, life-giving sunshine; and human science can never discover a substitute for the divine light of health and life.

Where houses are overshaded, the nervous system also suffers as well as the general bodily health. Mental disturbance, melancholy and madness, are to be apprehended from such dreary surroundings.

No one will pretend that the sanitary conditions of the majority of our summer resorts are at all equal to what they should be, or to what the public has a right to demand. As a local board of health has a right and a duty to close a house injurious or dangerous to health and life, and forbid its occupancy until reasonable sanitary requirements have been observed and causes of danger removed, so it would almost seem, as a reasonable inference, that a national board of health should have power to discipline summer resorts and other localities, and prevent the seekers for health and pleasure from risking their own and their children's lives in places desperately neglected, unhealthful, and dangerous. Many such places exist where overshading is the greatest obstacle to needed sanitary reforms, and where, indeed, little can be accomplished for the future sanitary improvement of the place until the axe has been given full sway, and sunlight admitted to disinfect the foul earth.

> "Oh! that one ray of golden light
> Could pierce this never ending night—"

so cries the prisoner in his dark and dreary dungeon. Can we not, as physicians, feel the warmest pity for those who are deprived of the blessed sunlight? Do not the stories of the captives and the victims of Russian cruelty appeal to us more strongly when we think of their dark and sunless existence? Light and life are the divine gifts; death and darkness the portion of those who hate the light.

We must admit, then, that the evils to which we have referred cannot be overestimated, and they are certainly serious enough to arouse the attention of the medical profession to contend against them. We can readily understand that the beauties of the foliage, which are so justly admired, are often attained at great loss of health, and even loss of life itself; and undoubtedly consumption, that most cruel and dreadful disease of these latitudes, is caused in countless instances by overshading our homes, our house yards, and our streets.

Every intelligent man, who loves his family and recognizes his duties as the responsible head of a household, must occasionally ask himself whether or not the house he is occupying is safe for those he loves better than himself. All should be keenly alive to the importance of proper sanitary surroundings, and nothing should be neglected, and no vigilance spared, to make the home as secure against disease as against the intrusion of burglars. A happy, healthy home, with God's glorious sunshine within and without, and the sunlight of children's smiles at the fireside, is a reward for our vigilance and duty worthy of our most constant devotion.

> Truly the light is sweet, and a pleasant thing it is for the eyes to behold the Sun.
> —Eccles. x: 7.

VIII.

THE UNITED STATES CENSUS IN ITS RELATIONS TO SANITATION.

By JOHN S. BILLINGS, Surgeon U. S. A.

I have several times inflicted upon this patient and long-suffering Association papers relating to statistical matters and methods, which, it must be confessed, were better fitted to serve for occasional reference than to occupy any of the scanty time available for listening at our annual meetings. To-day, however, I have a very short discourse on the same subject which I want you to listen to, because, if the suggestions in it have any value, some of them should be acted on before the paper will probably appear in the volume of our proceedings.

Theoretically, we all agree that vital statistics are the foundation of public medicine, but, practically, I suppose that the majority of sanitarians and physicians think that they are not essential to the work of a health officer or board of health, although they may be desirable; that the main objects in sanitary work are to see that the water-supply is pure; that garbage and excreta are promptly removed or destroyed; that no filth is allowed to accumulate in the vicinity of habitations; that contagious diseases are controlled by isolation and disinfection; that plenty of fresh air be provided in schools, churches, etc.; and that all this can and should be done whether death-rates are known or not.

This is not my own view, because my observation of the progress of public health work in this and other countries for the last twenty years leads me to believe that this progress, in any locality, for any considerable length of time, depends upon the completeness of its vital statistics and the use that is made of them; because upon such completeness and use depend mainly the amount and regularity of appropriations from state or municipal funds for the payment of the expenses needed to secure the objects of the health department. Occasionally it is possible to get up a cholera, or yellow-fever, or small-pox, or typhoid fever scare, and to then get a little money for sewerage, or for street and alley cleaning; but these spasmodic reforms do not last long, and in most cases do not amount to much. You have got to produce constant, undeniable evidence that the work is needed, and is useful, evidence that will convince the press and the majority of the community; and this evidence must be mainly death-rates, to which should be added all the sickness-rates that can be obtained.

To give these death-rates you must have a complete registration of deaths, and a corresponding enumeration of the population, and you ought to have a complete registration of births. I shall speak to-day only of the enumeration of population, an absolutely essential factor in the preparation of death-rates. As you know, we rely mainly on the decennial United States census for this enumeration of population.

In a few states there is an intermediate state census, and occasionally in cities there are police censuses, school censuses, etc., but these last relate only to a particular class of the population, and are always incomplete and unreliable for the purposes of vital statistics.

Before this Association meets again, the eleventh United States census will have been taken, and its methods, its completeness, and the mode in which its results will be tabulated and published, are of great interest and importance to all who are interested in sanitary science or in public health work in this country. Let us consider briefly what the health officials of a state or city want in the way of census data, and, first, as to the needs in a city such as New York or Brooklyn. For the whole city and for certain districts of the city we wish to know the number of residents. Moreover, we wish to know not merely the total number, but the number in each group of ages of each sex, of the married and single, of those engaged in certain occupations, and, for certain districts, of certain races.

One of the most important questions, then, to be settled before the census is taken is, What shall be the boundaries of the special districts of the city for which a separate statement of the population is desired?

In some cities the wards form fairly satisfactory districts for the purpose; and where this is the case it makes the problem very easy. The census publishes the total population by wards, but heretofore it has not done this with distinction of sex and age. I have no doubt, however, that if the officer charged with the registration of vital statistics makes timely application to the superintendent of the census, he can obtain from him in due time a statement of the population by wards, with distinction of sex and color and of age, or, at all events, of the number under one year and under five years of age, which is the information most essential in a sanitary point of view. Also, if there are one or two districts in the city of which he specially desires to know the population, he can probably arrange with the supervisor of his district to obtain it if he communicates with him before the enumerators' districts are fixed. For about a dozen of our large cities it is proposed to make a systematic division of the area into sanitary districts, having special relations to altitude, character of habitations, or of population, etc., and to have special death-rates calculated for each of these districts. This is being done in conference with the health authorities of these cities; and it is hoped that in this way some very interesting data will be obtained which will serve as a foundation for sanitary work in the future. Such districting has been arranged for Boston, New York, Philadelphia, Brooklyn, Washington, New Orleans, and Louisville, and the work is in progress for other cities.

For each city, taken as a whole, the details of population as to sex, color, and age will be given in greater detail than has been done in previous censuses; and this will be found extremely useful by health officers wherever there is a complete system of registration of deaths.

In investigating the details of the records of deaths kept in different cities, I have noted deficiencies in a few of them to which I wish to call the attention of all who have to do with the registration of vital statistics.

First. All deaths occurring in hospitals should be charged to the ward or district of the city from which the patient was taken to hospital, when this can be ascertained. Otherwise the death-rate in the ward in which the hospital is located will be too high, and in the other districts it will be too low.

Second. The birthplace of the parents of the decedent should be reported. We want to know the race of the decedent, whether he was Irish, German, Italian, or American, and to give merely his own birthplace is not sufficient.

Third. It is very desirable that in all cases of deaths of colored persons it should be stated whether the decedent was black or of mixed blood, such as mulatto or quadroon.

One of the most important questions in the vital and social statistics of this country relates to the fertility, longevity, and liability to certain diseases of those partly of negro and partly of white blood, and the only way to obtain data on this subject is through the registration of vital statistics.

Under the provisions of the law providing for the census, the living colored population is to be enumerated with distinction as to whether each person is black, mulatto, quadroon, or octoroon; and we need the same distinctions for all colored persons dying during the census year, to enable us to calculate comparative death-rates. Wherever there is a fairly accurate registration of deaths, which now exists in several states and in over one hundred cities, the next census will afford the means of calculating death-rates with distinctions of color, sex, and age, which will furnish important indications for sanitary work. For all cities of 10,000 inhabitants and upward, it is proposed to collect as complete information as possible with regard to altitude, climate, water-supply, density of population, sewerage, proportion of sewered and non-sewered areas, and other points bearing on the healthfulness of the place, which will permit of interesting comparisons with the death-rates.

Owing to various causes the reports of the last census were so much delayed in publication that their practical interest to sanitary officials was greatly diminished, and it was not possible to secure the distribution of those volumes relating to mortality and vital statistics, to the social statistics of cities, and to the insane, idiots, deaf, and blind, to many of those sanitarians and physicians who most appreciate the information they contain, and who would make the best use of them. I have no authority to make specific promises, but I believe that the reports of the next census, in which the members of this Association are specially interested, will be published as soon as it is possible to compile them, and will be distributed to those sanitarians and physicians who need them in their work, and who make timely request for them; and thus believing, I do not hesitate to ask the cordial coöperation of all members of this Association to make the data upon which these reports are founded as full and accurate as possible.

I hope that the vital statistics and statistics of cities, as collected for the eleventh census, with the coöperation of the physicians of the country and of municipal officials, will be so compiled and published as to be an unanswerable argument in favor of systematic public sanitary work, and of the granting by state and municipal authorities of the funds which are absolutely necessary for the proper performance of such work. I know that the superintendent of the census has a strong and intelligent interest in the completeness and accuracy of these statistics, and will do all in his power to secure their prompt publication and wide distribution; but to make the data so complete as to be useful in every town and township where there is no registration, he must rely largely upon the aid of physicians and of all intelligent citizens to correct and supplement the results which will be obtained by his army of enumerators. This aid has been already asked for by circulars and registers distributed to physicians, and it will be again asked for by the enumerators themselves when they come to make up their records. Let us all do our best to help them, and thus to make the vital statistics of the next census not only an accurate representation of the life-stream of a great nation, but a powerful means of promoting the health and welfare of our people.

IX.

DO THE SANITARY INTERESTS OF THE UNITED STATES DEMAND THE ANNEXATION OF CUBA?

By BENJAMIN LEE, A. M., M. D., Ph. D.,

SECRETARY OF THE STATE BOARD OF HEALTH AND VITAL STATISTICS OF THE COMMONWEALTH OF PENNSYLVANIA.

As the passenger on board the beautiful little steamer of the Plant Line, the Olivette,—beautiful not simply from her graceful lines and symmetrical proportions, but beautiful in the eyes of the sanitarian from her exquisite cleanliness and the perfection of her sanitary arrangements,—approaches the ever faithful isle at day-dawn, and sees the first rays of the sun warming the deep brown tints of the Morro Castle and the frowning fortress which crowns the hill-tops behind it, and casting a rosy blush over the snowy palaces and battlements on the opposite shore of the harbor, his eye is especially delighted with the intense blue and brilliant sparkle of the water. As the flying fish dart in flocks from the azure beneath him, and, skimming the crests of the waves, drop diamonds from their gauzy fins, it seems as though water never could be purer or more brilliant. As he passes swiftly in through the narrow gateway to the port, scarcely more than two hundred yards wide, and steams to the anchorage in the middle of the harbor, the waves still flash and sparkle in the sunlight, and there is nothing to indicate that his vessel is floating in a stagnant pool, so full of all manner of filth that but for the corrective presence of the chloride of sodium in the water it would all rapidly become putrescent. Such, however, is the simple truth. Nearer the shore he will find the color of the water noticeably changed, its brilliancy clouded, and the bubbles which rise from the bottom will indicate the presence of decomposing matter. This basin, about two miles long and nowhere a mile wide, with an entrance like the mouth of a bottle, is the receptacle for all the drainage the city possesses, and the filth that is not received here soaks into the ground. With an average annual temperature of about 80° F., what less could be expected than that yellow-fever, the child of the tropics, should make its home here? And so indeed it does.

Dr. Wolfred Nelson does not put it too strongly, in referring to the present condition of affairs, when he says that "the poison of yellow-fever is just as much a part and parcel of the city of Havana as the houses and churches of New York are a part of that noble city," or when he "makes bold to state that the yellow-fever poison is as much an article of export from that island as are its famous cigars."

It must be remembered, that while the passenger steamers carefully anchor in mid-harbor, the sailing vessels do not hesitate to go up to the docks, where they lie side by side in the very thick of the sewage. The ship Teneriffe, which brought yellow-fever to the Delaware breakwater in the summer of 1888, had been moored directly under the windows of the dead-house, in which yellow-fever corpses were awaiting sepulture.

But that the presence of this contagium in Havana is not a necessity is demonstrated by the fact that in other parts of the island where the thermal mean is still higher the disease is rarely seen. All intelligent observers agree, that, were a proper and comprehensive system of drainage introduced, by which the feculent and other putrefiable material which now pours by thousands of gallons daily into this land-locked pond, should be transported to a considerable distance west of the mouth of the harbor, and there deposited in the open sea; were all cesspools and privies abolished, their contents thoroughly disinfected and removed, and the filth-sodden soil surrounding them excavated and replaced by clean, fresh earth,—yellow-fever in Havana would soon be a thing of the past, and the island would become a noted health resort rather than a plague-spot. But by whom shall this immense work be undertaken? By the native inhabitants? They are already so burdened with taxation that they have little to spend on municipal improvements. On the mother country? Spain has never looked upon Cuba as anything but an orange to be sucked. She claims that the island now costs her more than it brings in: and, with her standing army of occupation, her seventy-two thousand Spanish volunteers, and her horde of hungry civico-military place-men, it may be true that the balance is not much in favor of the royal coffers. Notwithstanding the comparatively liberal tendencies of the present governor-general, until the leopard changes his spots it is not probable that the Spaniard will change his traditional policy toward the Gem of the Antilles, or that sanitary improvements of a substantial character will be made in the city of Havana. Can foreign residents be looked to to take the initiative in this reform, by making voluntary contributions towards the expense? Unfortunately the illiberal policy of the colonial government is making their residence there both precarious and unprofitable, and their number is steadily diminishing. The only hope is in an entire change of government.

Another disease which prevails on the island, and of which there are frequent devastating outbreaks, is variola. Little, if any, attempt is made to enforce vaccination. The negroes, and to some extent the native Cubans also, look upon small-pox as a visitation of divine Providence which it is impious to attempt to interfere with. Hence, the unprotected portion of the population is very large, and the disease finds many victims.

But perhaps the most serious, because the least suspected, and most insidious danger to the health of this continent from the source indicated lies in the prevalence and steady increase of leprosy in Havana. I shall waste no time in the Quixotic attempt to prove the contagiousness of this disease. Any mind which can contemplate the history of leprosy, from Moses to Damien, including the recent researches of Berger and Morrow, and still entertain a doubt on this question, is so thoroughly warped as to be beyond the reach of reason or logic. Moses had more brains in his little finger, sanitarily speaking, than such a man in his whole head. Father Damien and the washerwoman of the leper hospital were the two last legs that the non-contagion theory had to stand on, and both have been knocked from under it by the horrid and inexorable logic of the disease. Even while Father Damien was being paraded as a proof of the non-contagiousness of the affection, he was obliged to send to a distance for an assistant missionary to hold his book at mass, his own anaesthetized hands refusing longer to perform that function. And now I am credibly informed that this assistant has already developed unmistakable evidences of the infection in his own person. To obtain an adequate idea of the horrible capabilities of this contagion for mutilation and disfigurement, one should see it in all its varied forms and stages at the Hospital of San Lazaro in Havana. I was kindly introduced here by Dr. Burgess of the United States Marine Hospital service, but subsequently made a more careful study of the institution under the guidance of Dr. Berger, who was personally acquainted with each case, and who was, at the time, staying in Havana in order to study the development of the lepra bacillus. When I say that in this admirably appointed institution, scrupulously clean, well ventilated, supplied with every comfort, and under the care of a skilful physician, having accommodations for four hundred patients, I found but eighty-six inmates, while it is safe to assert that there are not less than a thousand lepers on the island, it will be understood that it is not enough to provide a refuge for these unfortunates. They must be compelled to enter it and remain there if the community is to be protected. And this they will never be, so long as Cuba remains under its present rule. When one walks the streets of Havana with a watchful and discerning eye, he finds a leper at every turn. It may safely be said that there is no business in which they are not engaged. Stopping to buy a newspaper of a man sitting on a street corner, the paper was presented to me between two mutilated stumps of wrists, the hands having been entirely eaten off. On the next corner was an old woman selling cheap confectionery. There was nothing very marked about her hands or face, but her leg was enormously enlarged ; and when she somewhat unwillingly pulled down her stocking at Dr. Berger's request, maculæ were distinctly visible. A well known book-seller has for years been a leper. A proprietor of one of the hotels is a sufferer. One can be shaved, if he is so foolish as to need shaving, by a leprous barber. Undoubtedly many lepers are employed in the cigar factories. I confess to a certain feeling of self-gratulation on the fact that I am not a smoker, after seeing leprosy in Havana. While sitting at dinner in one of the finest hotels of the city, close to a window which opened down to the floor and was separated from the street or passage-way only by an iron grating, I heard a plaintive, muffled voice close to my ear. Looking round, what was my horror and disgust to see a fingerless hand thrust through the bars for alms, not twelve inches from my plate. And so it is, that in every relation of life one is confronted with the evidence of the general dissemination of this horrible, incurable disease among the people. I am well aware that Cuba is not the only one of the West Indies where the infection is doing its deadly work. But this makes the case stronger, not weaker. In conversation with Dr. Berger, I obtained the following approximate figures as to different points at which provision has been made for the segregation or care of lepers.

Near the Port-of-Spain, on the island of Trinidad, there is a leper settlement and also a hospital. This is situated about six miles from the town. About six or seven hundred are found here. At Nassau there is a hospital divided into barracks. The number constantly here is small, perhaps not over a dozen cases; but they are scattered all through the neighboring islands, and many of them live on fishing boats.

Choco or Cocoa bay is generally recognized as its great breeding-place. Hence, in the vocabulary of the islands, this name has come to stand both for the disease and for the affected individuals themselves.

At St. Thomas there is a voluntary settlement of lepers under governmental supervision, numbering from six hundred to eight hundred individuals. In the Grenada settlement there are more than five hundred segregated and under the oversight of the government.

But the fact remains that they find their way into this country *via* Havana, that being the nearest port, and one with which there is daily communication. Already has a focus of infection established itself at the first port of entry on this line, Key West.

Whether we accept the exact number reported by Dr. Berger in the *New York Medical Journal* of Jan. 5, 1889, as living in that town, or not, his showing is such as to excite grave apprehension; and he deserves our thanks for his persistent energy in investigation, and for his courage in publishing his discovery. The authorities at Tampa are taking the alarm, and have sent two cases back to Cuba, under the clause of the emigration law which provides that immigrants suffering under any chronic infectious disease may be returned to the place whence they came. If by our negligence and short-sightedness we allow this contagium to become widely disseminated in this country, we may not suffer in our persons, but our children and our children's children, for many a generation to come, will. As Dr. Morrow well observes, in the *New York Medical Journal* for July 27, 1889, "The teachings of observation and experience show that in all countries invaded by leprosy its first approaches have been slow and insidious. To take the Sandwich Islands for example: We find that for twenty years after the first case of leprosy was identified the disease spread slowly, without making sufficient advance to attract the attention of the health authorities. When they awakened to the realization of the danger which threatened the public health, the disease had already gained such headway that they found it impossible to arrest its progress even by the most rigid system of segregation. It has continued to spread until it threatens the ultimate extinction of the Hawaiian race."

Let it be remembered that this fearful result has all been accomplished within the memory of most of us here present. Within the past year more than five hundred lepers have been discovered and sent to Molokai, and this out of a population of forty thousand. Dr. Morrow estimates that probably one fifth of the native population are lepers. It is absurd and childish for us to take refuge in a fancied immunity due to race or climate. We are Europeans by descent. Our climate is sufficiently like that of Europe. And five hundred years ago every town in Europe had its lazar house, France alone containing within her borders two thousand such institutions. Some of our quarantine stations still rejoice in the name of Lazarettos. To sum up then:

SUMMARY.

1. The exigencies of traffic and travel render rapid and constant communication between the United States and Havana a necessity.

2. Havana is one of the most notorious breeding-places of yellow-fever, and is never free from its presence.

3. The only means by which the germs of this disease can be eradicated are a proper system of sewerage and drainage, which shall deliver the filth of the city at a distant point into the waters of the ocean, and the removal of all the feculent soil.

4. There is no hope that the Spanish government will ever undertake a work of this magnitude for a dependency.

5. The introduction of yellow-fever into the United States, through both legitimate and illegal channels of trade, must be of frequent occurrence, so long as this condition of things continues.

6. A single widespread epidemic of yellow-fever would cost the United States more in money, to say nothing of the grief and misery which it would entail, than the purchase-money of Cuba.

7. The precautions against the spread of small-pox in Cuba are entirely inadequate, and are rendered ineffective by reason of the superstition of a large proportion of the inhabitants. Hence epidemics of that loathsome disease are of frequent occurrence.

8. Leprosy prevails in Havana and the island of Cuba to a serious and constantly increasing extent.

9. Leprosy is absolutely unrestricted in this island. While there is an immense and admirably administered leper hospital in Havana, its inmates go and come among the residents of the city and country at will, until locomotion is rendered impossible by mutilation.

10. The ravages of the disease are confined to no class or race.

11. Leprosy has already obtained a foot-hold in the United States in

the port nearest to and in most constant communication with the Island of Cuba.

12. Leprosy has but one history, that of constant progression unless it is checked by isolation of the most absolute and unrelenting character.

13. No centre of leprosy has ever originated in the United States. The importation of the first case of a series can always be distinctly traced.

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X.

A SUGGESTED MINIMUM BASIS OF COMPENSATION TO LOCAL HEALTH OFFICERS.

By GEORGE HOMAN, M. D.,

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Frequent occasion has arisen, since my connection with a state board of health began, to note not only the usual inadequacy, but the unsettled basis on which compensation for the services of town and county health officers was allotted, both in Missouri and elsewhere; and being of the opinion that a minimum rate of pay for such officials should be fixed by legislative act in order that an approximate degree of uniformity should prevail throughout the state in this regard, and the matter thus removed to some extent beyond the caprice, ignorance, or parsimony of town boards or county courts, I began early casting about in my mind seeking how such a basis could be best determined and secured; but in the endeavor to solve the problem I could get no help from other states as to how such compensation was adjusted, and I am equally at fault regarding the practice abroad in this respect.

Obviously, the duties of the executive sanitary officer of a county or town can have no natural relation to the taxable or actual wealth of the territory within his jurisdiction. As health officer, his official powers and functions relate primarily to persons and not things, and to every individual within his limits, without regard to age, sex, color, social condition, or position. Such being the case, the numerical human population should be adopted as the natural determining factor in deciding the question of pay of sanitary officials; and I desire it to be understood that what is said here bears solely on the question of the salary of the health officer, and not to office or operating expenses, funds for the abatement of nuisances, etc., etc., although I believe an extension of the same principle would secure to such purposes a fair if not liberal financial support.

The total human population of a stated district or territory being decided on, then, to determine this question, the amount per capita per annum each person should be assessed next came up for consideration, and, in connection with it, the last United States census was consulted to ascertain the population of certain selected corporate subdivisions of the state, these being self-governing bodies in local affairs.

It was found that, in the most populous of these civil units, namely, the city of St. Louis, a rate of one cent. per annum from each person, according to the census enumeration, would yield the sum of $3,500. As the present salary of the sanitary executive of the city named is $3,000 per annum, with, in addition, the services of a considerable number of paid assistants and subordinates, the test showed that the rate was not far wide of a fair scale of compensation for such services.

On applying the same test to other populous portions of the state where the support of health officials is provided for, it was happily found that the proposed minimum was generally exceeded.

In testing three or four of the least populous counties, it was found that by the proposed rate the pay of health officers would range from twenty-five to fifty dollars annually—pittances scarcely worth considering; but these counties being rather mountainous, with few towns, and with family domiciles generally well scattered, would have comparatively little need of such officials.

There is no statute in Missouri at present requiring the formation of boards of health in counties, or the appointment of health officers; and it is only in older and more populous portions of the state that such bodies or officials are to be found.

The state board of health has been embarrassed and inconvenienced in the performance of sanitary work in the state by this defect; and the collection and recording of vital and mortuary statistics, as required by law, have been found to be practically impossible.

In order to cure this fault and effect a thorough sanitary organization of the state, our board framed a bill to create and establish county and other local boards of health, and providing for the appointment of a health officer in every county who should be the secretary and executive officer of the county board, and who should be in close relation with and make regular reports to the state board. This bill, framed and matured after much consideration, contained the provision that the minimum rate of his compensation should be on the basis of one cent per capita per annum of county population, as determined by the latest state or United States census, this being decided on in order to prevent the practical nullification of the law, if the bill was passed, by county courts refusing to provide means for the pay of such officers, or fixing the rate so low that proper and competent persons could not be had for the position.

The bill was recommended for passage to the general assembly last winter, and was passed by the senate with the provision referred to intact, but failed to be called up for final passage in the house. At the next session, however, it is hoped better success will be attained.

While the suggested rate must appear ludicrously small to a person of even limited intelligence, but who is able to appreciate health and the benefits that flow from the detection and removal of conditions that make for disease, still its very insignificance as the thin end of the wedge constitutes an advantage in dealing with legislators of a certain class prone to captious cheese-paring on the slightest provocation, as the most close-fisted and short-sighted law-maker could hardly raise against it the objection of extravagance, and it commends itself accordingly as a means of avoiding a rock in the legislative channel on which many good measures have been wrecked.

To summarize:—(1) The fixing of a minimum rate is of importance to public health officials as defining a limit below which compensation shall not go, and, by placing this at a living figure, preventing the virtual abrogation of sanitary laws through the mistaken and foolish economy of county courts and other local bodies.

(2) The suggested minimum basis establishes a rate of compensation in strict relation to the population extent of a health officer's duties.

(3) The rate, while low, is still sufficient fairly to compensate such an official for the performance of his purely sanitary work.

(4) The basis suggested is so low as to be unlikely to provoke legislative opposition to its adoption.

(5) The adoption of some such provision as a legislative enactment would, in an educational sense, be a distinct step toward a more general recognition and acknowledgment on the part of the public of the fact that the benefits and advantages to the population of good health can only be had by hard work, and maintained by eternal sanitary vigilance, with a liberal outlay of means to retain the services of competent officials trained and skilled in all the lines of public hygiene.

XI.

STATISTICS OF RIVER POLLUTION, WITH OBSERVATIONS UPON THE DESTRUCTION OF GARBAGE AND REFUSE MATTER.

By S. S. KILVINGTON, M. D.,
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A year ago I enjoyed the opportunity of addressing this Association upon the question of refuse-destruction by fire. I outlined, at the same time, the history of cremation, and gave to this body a descriptive sketch of the several crematories manufactured in Great Britain, Canada, and the United States. This imperfect report, having been embodied in the Transactions of the Association, where reference to the facts it recites can readily be had, I shall not weary you with any repetition of its descriptive data.

Moreover, I conceive that it is the function of the committee, which I have the honor to represent, to discuss broadly the actual as well as the ideal methods now in vogue in the disposition of the refuse of our great cities.

By a strange fortuity, the title bestowed upon this committee would seem to indicate that its duty was limited to a consideration of the question of garbage-disposal alone; but such a disseverance of this minor topic from its natural and broader relations is as impossible as it is unwise. Our municipal authorities must meet and solve the problem of the disposition of their refuse materials, as a whole, for no system can be regarded as satisfactory in itself which necessarily demands the separation of one class of these waste materials from all other classes, and leaves the large remainder unprovided for and undisposed of. While we shall all admit that these several forms of refuse must be recognized individually, and that all forms cannot be cared for or destroyed by a single process, yet a metropolitan sanitary system must include means for the econcomical disposition of all its waste products; and, where the cost of labor cuts so large a figure as it does in this country, it cannot afford to undertake the careful selection of garbage to the exclusion of everything else.

In the majority of our cities this great problem of the disposal of waste matter is still practically unsolved, and that it is so is due, not to the absence of methods, not to the paucity of inventive skill, nor to a lack of ingenuity in devising means to this desirable end, but, in very large measure, to official indifference and popular ignorance of sanitary essentials.

Hoping he might be able to present to the Association a digest of statistics which would have some practical value, the chairman of your committee issued, some weeks ago, a circular letter to the health officers of one hundred and seventy-five cities in the United States. The interest which it awakened may be measured by the fact that it elicited replies from but sixty-six. Of these, less than one third evidenced the possession of any statistics regarding the quantity of waste materials disposed of per annum. This letter also invited an expression of the views of each writer regarding the best method of disposing of refuse materials; and the committee is glad to acknowledge very gratefully the effort made by a few of its correspondents to meet the request. But how little real appreciation of the pressing importance of such an inquiry exists. either in the professional or the public mind, is illustrated over and over again in the larger number of these replies. Health officials, in cities ranging from 100,000 to 500,000 in population, remark that they "have not thought about it," that they "have no opinion on the subject," and that they "have had no experience and entertain no views;" while, on the other hand, one unfortunate health officer, in a city of some 30,000 people, himself enthusiastic for sanitary reform, plaintively declares that in his town, as in ancient Sodom, there "are not ten righteous" enough to manifest the least interest in health measures of any kind. But although these reports from our American cities are rich neither in figures nor in practical views, they offer abundant testimony to the fact that in the matter of waste disposal we are, for the most part, in a deplorable condition.

If we do not share the fate of the ancient cities of the plain and are overtaken by no Nemesis in the way of regenerating fire and brimstone; if, like the Europe of the Middle Ages, we are not to be purified by the plague; if the cholera, in some of its periodic travels from its Indian home, does not find a foothold upon our shores,—it is simply because we are endowed with a wealth of air, of soil, and of water which permits us to violate, for a time, with seeming impunity, the laws of health.

But an end to this period of abused privilege is at hand. The characteristic feature of our economic development is the increasing concentration of the people in cities, and it carries with it a menace to the public health. We can no longer leave to nature the chemistry of our waste products without danger to ourselves. She demands acreage per capita for her operations, where we can afford to give her a beggarly allowance of square feet. And yet, to-day, in all but perhaps a dozen of our American cities, we are still taxing nature with this impossible task. Witness these reports, which include among them the cities of New York, Brooklyn, Philadelphia, Chicago, Milwaukee, Minneapolis, St. Paul, Detroit, Buffalo, Memphis, New Orleans, San Francisco, Oakland (Cal.), Manchester, Norfolk, San Antonio, Galveston, Cleveland, Dayton, Syracuse, Wilmington, Taunton, Providence, New Haven, Jersey City, Worcester, Denver, Savannah, Rochester, Springfield, New Bedford, Cambridge, Reading, Atlanta, Charleston, Pittsburgh, Alleghany, Washington, Richmond, Bridgeport, Omaha, Kansas City, Louisville, Toledo, Chattanooga, Cincinnati, Nashville, St. Louis, Rock Island, Dubuque, Hamilton, Leavenworth, and Council Bluffs.

The refuse materials which these cities have to dispose of come under seven heads,—(1) ashes, (2) garbage, (3) offal, (4) dead animals, (5) manure, (6) night-soil, (7) sewage. What becomes of them? The first item—ashes—may dismissed with the statement that this material is commonly and wisely employed in the making of roads, levelling of alleys, and the filling of low lots. There is nothing objectionable in this practice, provided sufficient care is taken to keep the ashes free from animal and vegetable waste. It would be fortunate if all our refuse could be disposed of as easily and as harmlessly as this. The three succeeding items—garbage, offal, and dead animals—may be discussed in common, for they are usually subjected to similar treatment, and are alike susceptible of the more superior methods of disposal.

We find that these materials have a widely variant destiny in different cities.

(1) *They are fed to domestic animals*, notably to milch cows and swine; and one health officer assures us that the hog not only consumes but collects his diet at large, and that "a fine scavenger he is, and does it free of charge."

(2) *They are dumped into neighboring rivers, lakes, or ocean.*

(3) *They are buried*, in many instances, outside the city limits.

(4) *They are rendered*, either by ordinary soap and grease producers, or by a process known as the "Merz system."

(5) *They are burned*, either in open fires, or by means of some one or other of the several crematories now in use.

Animal manure usually goes with these other materials into the water-courses; it is sometimes buried, is seldom burned, and oftener is carried to the country districts and used for fertilizing in its raw form.

Night-soil is occasionally composted and employed to enrich the soil; is more commonly used to improve the water-supply; is once in a while destroyed by fire; and is quite generally buried upon dumping-grounds, or left in privy-vaults, which are economically covered and replaced by new ones as soon as they are filled.

Sewage is carried into river, lake, or ocean, as the case may be, save in those rare instances—of which the city of Pullman, Illinois, is a type—where it is disposed of upon sewage farms.

Now what of the results? Comment upon the practice of feeding garbage, offal, and carrion to animals destined for use as human food is unnecessary. The hog may be as good a scavenger as the jackal or the dog of Asiatic communities, but he merely substitutes one nuisance with another, and should be regarded as unclean, in consequence, by Christian as well as Jew.

The protest which should be uttered against the pollution of either river, lake, or ocean, by the deposit therein of waste materials must differ only in a degree proportioned to the character of the body of water and the domestic usage to which it is put. The practice is undesirable at the best, and is intolerable, so far as river or lake is concerned; when either is the necessary source of water-supply to communities resident upon its shores. The extent to which this crying abuse is carried can only be remotely estimated by the few figures at command; but these are sufficient to call forth alarm, and to emphasize the necessity for a radical reform. They are suggestive enough to warrant quotation.

In the Mississippi river, eight cities alone deposited, during the past year, 152,675 tons of garbage, manure, and offal, 108,250 tons of night-soil, and 3,765 dead animals.

Into the Ohio river, five cities alone dumped, within the same period, 46,700 tons of garbage and offal, 21,157 tons of night-soil, and 5,100 dead animals.

Into the Missouri river four cities alone have cast, in the same twelve months, 36,110 tons of garbage, manure, and offal, 22,400 tons of night-soil, and 31,160 dead animals. Recall the fact that a large proportion of these animals have been killed because they were suffering from glanders, farcy, hog cholera, hydrophobia, pleuro-pneumonia, and tuberculosis; multiply these figures by the lowest possible multiple, and add, to this great mass of decomposing material, some thousands of miles of sewage discharged into these three rivers,—and the mind can form some dim conception of the degree of their pollution. No theory of the self-purification of running water will suffice to dwarf the magnitude of this sanitary crime. Happily, the United States corps of engineers has taken cognizance of this evil in its recent reports to the government, and it is to be hoped that the national authorities will ere long put a peremptory veto upon its continuance.

Like condemnation should be put upon the practice of the earth-burial of waste materials in large masses and in close proximity to our great cities. What shall be said of communities, ranging in population from 100,000 to 1,000,000, which boast the possession of fifty or a hundred acres of land just inside or outside their corporate limits, upon which they dump or bury, in closely planted shallow pits, thousands of tons of night-soil, garbage, offal, and dead animals! The human cemetery, fraught with peril to the purity of air and soil and water, and destined to endanger life and health, as a spreading population hems it in, is innocent in comparison with this. And what sort of sanitary recompense is in store for cities whose officials confess to the filling in of low lots with the contents of their cesspools and privy-vaults, or to the habitual burying of these conveniences as they become filled! What is to be the future health history of a community whose building-sites are honeycombed with these deposits!

But even while we view with consternation these crude attemps at the disposal of refuse, we greet with pleasure the evidences that a better time is coming in the sanitary management of these materials. Two methods remain, which commend themselves to the student of this important theme, viz.,—

(1) The rapid decomposition of these waste products by the speedy

withdrawal of the water and gases which they contain, with a view to converting them into profitable forms of fertilizer and machine oil.

(2) The rapid and complete combustion of these materials, with a view to their entire destruction.

The first of these methods has the advantages of intended economy. It is eminently proper that animal and vegetable waste matter should, if possible, be returned to the soil, of which it constitutes the natural and necessary nutriment. Animal manure and stable refuse may be safely conveyed, in their raw form, as it were, to farm or garden lands, provided the latter, in need of fertilization, exist within so short a distance from the limits of a city that the cost of the carriage of so bulky a fertilizer will not put it beyond the reach of the agriculturist. As a rule, however, he demands soiling materials in concentrated form ; and the process and the apparatus that will produce these safely and cheaply is the hope of the future. Rendering-works have attempted to reach this result, and do reach it in a clumsy way ; but the remedy is commonly so much worse than the evil they seek to cure, that they cannot be tolerated within or near the limits of a city. A scientific piece of apparatus, known as the "Merz System," has been devised, and is, or is soon to be, in operation in three or four large cities in the United States. It treats only garbage, and one pointed objection to the system is the necessity for the separation of the former from other waste materials. It has to prove itself upon the ground alike of economy and of sanitary safety before it can be accepted as a satisfactory solution of even this part of our problem. Like all other apparatus, much of its success must depend upon the care and intelligence that are bestowed upon it in its daily operation. Unquestionably, it is possible to apply scientific and sanitary principles to the rendering of animal fats, vegetable oils, and residuous fertilizers ; but they must be applied in such a way that the products will be marketable, wholesome, and easy of transportation. And even after these substances have thus been dealt with, we have a wealth of material on our hands in the way of dead animals, of night-soil and sewage, which must soon be forbidden deposit in our water-courses and great lakes, and which has an even more noxious quality and an even higher fertilizing value than the garbage and dead animals with which the "Merz System" proposes to deal. With these concentrated soiling materials at hand demanding some disposal, is it, after all, worth while to extract the comparatively scanty fertilizing residuum which remains after the rendering of carrion and vegetable waste? Is it not better and cheaper and safer to destroy at once, by cremation, these readily combustible materials, together with stable refuse, and to apply ourselves most assiduously to the problem of deodorizing, diluting, and safely transporting to the soil the sewage and night-soil with which every large community is so injuriously burdened? So high a percentage of fertilizing value per volume do these materials possess, that they promise a revenue which will well repay the cost of preparation and safe carriage. But a small bulk of such a fertilizer, in convenient form for handling and distribution, would be required by the gardener or farmer to fructify his lands, in comparison with the amount of the solid fertilizing residuum of animal and vegetable matter, in the gross, which he would need.

In the meantime, the crematory, under several patents, has proved itself to be a practical success in many places. The Engle, the Rider, the Patrick, and the Mann furnaces are actively in use in several cities. Out of thirty-five health officials who have favored me with a reply to my request for an expression of opinion upon the disposal of garbage and other refuse matter, twenty-three endorse the practice of cremation.

Says Dr. Salamon, of the Louisiana board,—"Cremation I believe to be the best, safest, and only sanitary method of garbage disposal."

Dr. Bidwell, of Leavenworth, says,—"I am decidedly in favor of cremation as the best method of disposing of waste materials."

"There is only one scientific and practical way of disposing of garbage, and that is cremation," says Dr. Trebel, of Hamilton, Ohio. "Every city of 20,000 people should have a crematory," he adds.

"I am of the opinion," remarks Dr. Dudley, of St. Louis, "that cremation is generally the best method."

Dr. Ewing, of New York, replies,—"There is no doubt in my mind that the best method of disposal is by cremation."

"I am in favor of burning," says Dr. Martin, of Chattanooga.

Thus is public sentiment manifesting itself throughout the country.

To begin with first principles, I would educate the people, if possible, up to an appreciation of the advantages of this method. The household cremation of animal and vegetable waste is a sanitary and an economic possibility. The ordinary kitchen range or the house furnace is a good incinerator. If the habit of banking up table refuse to dry upon one side of the stove or heater fire be adopted, it will be found that this material, freed of its excess of moisture, is an excellent form of fuel in itself. This complete destruction of household waste does away with all necessity for its accumulation and removal. The owners of markets and commission-houses, restaurants and hotels, would find it equally profitable to provide themselves with small private crematories for the destruction of refuse. Such a device, easy to operate, economical in its cost of support, and sanitary in its results, can be readily obtained. And as for municipal needs, which, after all private effort may do, will still remain in large measure, I have found no reason in the past year to change my belief that cremation is, if not a perfect process, at least the most desirable method for the disposal of the greater part of a city's refuse.

A somewhat varied and difficult experience in the attempt to educate the public in this faith has taught me that, in order to its best success, a crematory must be most carefully constructed, after a chosen model, and should be continuously operated. So built and so conducted, I believe it will most safely and economically dispose of all the coarser and combustible kinds of waste material. My own choice has fallen upon the Engle patent as being, with certain modifications, the most promising in its results. Its essential feature, without which, in some form, a crematory cannot be a sanitary success, is the provision of a second fire intended for the destruction of the noxious gases and vapors which inevitably escape the primary fire. Models of this and other patent furnaces are on exhibition to members of the Association, and well deserve your scrutiny. In New York the Engle crematory may be seen in practical operation, and will speak for itself. To those who have not investigated the merits of the system, the trip to the place of exhibition would be a very profitable one.

To return to our general theme. Among the hopeful indications of sanitary reform, the effort being made in several of our large cities toward the abolition of the privy-vault system is deserving of especial mention. Such a step will ultimately simplify the problem of waste disposal in the matter of one of its most important factors. New York is, I believe, the only city where this reform measure is an accomplished fact, but other communities are following in its wake. Where sewerage does not exist, decided preference should be given to the well constructed earth-closet; where the sewer is available, connections should be ordered as rapidly as possible. Minneapolis is, I am happy to say, now taking her initial steps in this direction.

The most important bar to the progress of the health measures we have discussed lies in the torpor of public sentiment, and it should be the highest function of this Association to stimulate the education of the people in these interests. We have relied too long and too implicitly upon our natural advantages, to the neglect of those precautions which would tend to preserve them. In this respect European cities are in advance of us, for, while their natural conditions are inferior, they have learned to enhance them by artificial means. Modern London, Glasgow, Edinburgh, Paris, Berlin, and Naples are object-lessons to us of a past which points with warning finger to *our* future, and of a present which sets for us the example of timely and efficient reform.

The American people are slow to learn the worth of improvements which cannot be estimated by commercial standards; and yet in these days it is undoubtedly true that health is an indispensable commodity, and that length of days and long life have an economic as well as an ethical value.

XII.

DISPOSAL OF GARBAGE AT MILWAUKEE.

By R. MARTIN, M. D.

COMMISSIONER OF HEALTH, MILWAUKEE, WIS.

Foremost among all the subjects that annoy and distress the health official, is the one of how *best* to dispose of the garbage of a city; and when garbage is spoken of, we mean the refuse from our tables and kitchens, and not manure and other dry material of that class, which in most cases can be very easily disposed of in the country around any city.

That the question is an important one is evinced by the extensive inquiries from interested parties, extending from the Northwest Territory to Georgia, and from almost every state and territory in the Union.

I do not propose in this brief article to enter into a history of how the ancients disposed of their garbage, nor even to tickle your ears with what our forefathers did with their refuse. This you have had in large measure at other meetings. I propose rather to give you *facts* that have been learned from an extensive experience relating to this most important of subjects at the present day.

First then is cremation. How many cremators are in the market to-day, each claiming some superiority over the other,—patents for every kind of a device conceivable, with that end in view;—the Bee Hive, the Mann, the Rider, the Engle, and the Forrestal are examples of the efforts in that direction;—but how *many* of them, or do *any* of them, merit the endorsement of the sanitarian?

I do not believe there is one of them that gives absolute satisfaction, and others I know to be an intolerable nuisance; and I was surprised when I examined the one in Chicago, for a more abominable nuisance could not well be placed on any half acre than I found on that one.

Each of the several plans has had its advocates; but cremation as a system has had its day, and a brief one it has been. Its claims have been largely exaggerated, guesses have been given as facts, and rash promises have been made that could never be fulfilled.

The Forrestal Cremator was in constant use in the city of Milwaukee for a period of twenty months, and during that time did the entire work of the city. It was not free from objections any more than the others, and gave off odors no *worse* than the others, but it answered its purpose in preparing the way for what was to follow.

The *collection* of garbage for any system is a most important factor, simple as it may seem. In many places the garbage is largely mixed with ashes and other material, which not only adds largely to the cost of removal, but makes the cost of disposal larger and much more difficult. The present system in use in the city of Milwaukee is the Merz system, one of the first erected by the company. It has been in constant use since the 11th of June last, and has given the best of satisfaction. The plant is owned by a number of our capitalists, and has a paid-up capital of $100,000. The quantity of garbage collected daily has steadily increased, until now we collect over forty tons daily, which, with that brought to the works by the commission dealers, wholesale men, and retail grocers, makes more than fifty tons per day, all of which is promptly disposed of. The works are located in a part of the city known as the Menomines valley, in the slaughter-house district, and the building is a substantial two-story frame building 62x110 feet.

The garbage teams drive up an inclined road-way to the second story, where the garbage is thrown on the floors to be scraped into the driers, of which we have eight, six having been in constant use since they began operations. The time occupied in drying the garbage varies with the quality and the amount of moisture in it, being from eight to eleven hours. The extractors, of which there are three, are then filled, and the oil extracted with benzine. This process likewise consumes another eight hours. Next, the bones are separated,—and the process is complete. So, in the short space of twenty-four hours from the time the garbage is brought into the building, it leaves in the form of oil and fertilizer. Our plant has been examined by parties interested in the question of garbage disposal, from different sections of the country, during the past few months, and all unite in hearty praise of its merits. Several of these parties on their return have recommended the plan as worthy of adoption. We may mention St. Paul, Denver, and Detroit, with others yet to hear from. The three mentioned are well under way, and in a few weeks will be in active operation. There is no offensive odor in or around the building, save in the room where the material is deposited; but as the garbage is not allowed to accumulate and the floors are scrubbed every day, the odor from that section is not bad.

I am an enthusiast regarding this system—and why? Because I went alone to the parent works at Buffalo, N. Y., as an unbeliever and opposed to its adoption (not knowing anything except from hearsay). I examined the process from beginning to end alone, saw what was being done and what might be done under more favorable conditions, and became a warm advocate of the system. Of all the questions that have arisen in the sanitary work connected with the city of Milwaukee during my period of service of more than eight years, none has given more trouble and annoyance than this question, that like a nightmare haunts the health officer, how best to dispose of our garbage, which has now been happily answered by the adoption of the Merz system of disposal. These few remarks have been dictated by the desire to stimulate inquiry in what I believe to be a move in the right direction, and we hope that other cities may look for themselves as we have done, and be satisfied.

XIII.

DISINFECTION OF DWELLINGS BY MEANS OF SULPHUR DIOXIDE.

By CYRUS EDSON, M. D.,

CHIEF INSPECTOR NEW YORK CITY HEALTH DEPARTMENT.

Within the past few years numerous experiments have been made by biologists with sulphur dioxide. They have failed in numerous instances to disinfect artificially infected rags and other material subjected to its influence.

These experiments have led biologists to pronounce sulphur dioxide unreliable in its action upon the contagion of disease.

I have had, in my official position, a wide experience with sulphur dioxide as a disinfectant, and I have been led to the conclusion that it is a thorough and an almost perfect destroyer of the infective matter of the acute exanthemata and diphtheria.

The facts that I will place before you in this short paper do not, I am aware, prove perfeetly and beyond doubt that SO_2 is an absolutely reliable disinfectant. They seem to me to be strong circumstantial evidence in its favor, and I present them as such.

The Disinfecting Corps of the Health Department of the city of New York, during the years 1887 to October 1, 1889, fumigated by means of SO_2 generated from burning sulphur nearly every room in tenement-houses in our city that had contained cases of small-pox, scarlet-fever, diphtheria, or measles. I say *nearly* every case. The aim of the department was to have the rooms in every case fumigated; but the corps was a large one, and occasionally a man was found derelict in his duty and had to be discharged, so that wilful neglect in a few instances caused some cases to be neglected. The method of using the sulphur was substantially in accordance with the rules laid down by the Committee on Disinfection of this Association. The sulphur was placed in a shallow iron basin, which was supported in a suitable tub containing water. Ignition was effected by means of about four ounces of alcohol poured over it.

I will take each disease separately, and by comparing the total number of cases with the number of cases that recurred, the recurrence of which could be attributed to infection left after fumigation, show the efficiency of the agent in question.

In the year October 1, 1887, to October 1, 1888, we had in our city 321 cases of small-pox. These cases occurred in 227 houses. Eighty-two of these cases were contracted from exposure to some of the 239 original cases; nearly all of which were in their turn traced to direct exposure to other cases, either out of the city or in it. Nine cases could not be traced to their cause. They were probably due to contagion from some mild, unrecognized case that travelled about spreading the disease. Not one single case of the disease was developed from the clothing or from the rooms in which these cases were, and from which they were removed to the hospital for small-pox. No other precaution was taken in the case of the rooms and clothing than that of fumigation by SO_2 in proportion of three pounds of sulphur to each one thousand cubic feet of air space for at least two hours. This, however, was done in a most conscientious and careful manner, immediately after the removal of each case.

Again: In the year October 1, 1888, to October 1, 1889, seven cases of small-pox occurred in five houses. All were traced to their cause, which was found to be direct exposure to a previous case. Not a single case occurred from infection left in the room or clothing by any of these cases.

We always permit occupancy of rooms that have contained small-pox patients as soon as they have been fumigated.

In this connection, the effect of fumigation by SO_2 upon vaccine virus is interesting. On October 2, 1889, ten quill slips charged with vaccine virus taken from a lot charged equally from the same animal, were exposed in a room 15x15x8, to the fumes of one pound of sulphur for two hours. Each slip was then used to vaccinate a child that had never before developed vaccinia. All failed to effect any result. Ten other points from the same lot were effective upon all but one child of ten other primary cases. This child evidently had considerable resistance against vaccinia, as it only took after the third trial.

For the purposes of this paper, the same comparison of primary cases with secondary cases as I have stated was done in cases of small-pox, was made of scarlet-fever, diphtheria, and measles in the following streets, which were chosen as examples of the worst, from a sanitary standpoint, in the city: Division street, Washington street, Rivington street, Mulberry street, West 16th street, West 12th street, East 7th street, East 12th street, East 46th street, East 102d street, East 113th street.

Let us first take scarlet-fever. From January 1, 1888, to October 1, 1889, 626 cases occurred in the above named streets in 453 houses, and 135 secondary cases occurred in 87 houses.

Of the 135 secondary cases, 106 occurred within five weeks of the beginning of the primary cases, to the direct contagion of which they were presumably due. This leaves but 29 cases out of a total of 626 that were possibly due to contagion left in rooms and apartments after disinfection by means of sulphur dioxide after the termination of each case.

During the same period (January 1, 1889, to October 1, 1889), 515 cases of diphtheria occurred in 382 houses, and 114 secondary cases occurred in eighty of these houses. Seventy-nine of the secondary cases occurred within four weeks of the beginning of the primary cases, to the direct contagion of which they were, therefore, presumably due. This leaves only 35 cases out of a total of 515 that were possibly due to contagion of diphtheria left in rooms and apartments after disinfection by means of sulphur dioxide after the termination of each case.

In the case of measles, 557 cases occurred in 361 houses, and 163 secondary cases occurred in 95 of these houses. One hundred and twenty-two of the secondary cases occurred within five weeks of the beginning of the primary cases, to the direct contagion of which they were, therefore, presumably due. This leaves only 41 cases out of a total of 557 that were possibly due to contagion of measles left on the premises after disinfection by means of sulphur dioxide performed after the termination of each case.

These figures are interesting when carefully considered, and they show the relative efficiency of sulphur dioxide in the case of each of the diseases. The gas is most destructive to the contagion of small-pox and next to that of scarlatina.

In the case of measles, we have an explanation of the comparatively large number of secondary cases. The disease is a mild one, speaking comparatively, and many cases are not properly isolated in the homes of the poor; consequently, rooms and material are infected outside of the apartment in which the patient belongs, and which the disinfector fumigates. Moreover, during the past two years we have had so many cases of contagious diseases, that measles have not received the attention of our inspectors and disinfectors that should have been given it, scarlet-fever and diphtheria taking most of the time of the men.

The contagion of diptheria would, from our statistics, seem to resist the action of sulphur dioxide most, and to be the most difficult to destroy. This is in my opinion due to the manner of its infection. The other three diseases infect a room by means of the medium of the air, the contagion being exhaled or given off from the body and deposited evenly over the surfaces exposed to the infected air. In diphtheria membrane and secretions are infected, and the contagion is protected by being surrounded by a protecting medium into which sulphur dioxide cannot easily penetrate. This is probably the reason why biological experiments with SO_2 are not satisfactory. It is impossible to imitate in the laboratory nature's method of infection. The power of penetration of SO_2 into the culture medium cannot be very great. The medium must to an extent protect the culture within it, so that only those cultures are affected that are on the surface of the medium. Just as diphtheritic secretions protect diphtheritic contagion, so do culture mediums to a less extent perhaps protect cultures.

In nature's method of infection, the infected air is carried by draughts and air currents into cracks and corners accessible only to a gas liberated under much the same conditions as the contagion.

CONCLUSIONS.

It would seem that the proper and most practical method of disinfection of dwellings after the occurrence in them of exanthemata and of diphtheria, is by means of sulphur dioxide, and that all clothing, bedding, etc., used in direct contact with the patient, should be removed to a disinfecting station, properly equipped, and there subjected to heat of sufficient intensity to destroy all contagious matter. This in future will, I believe, be the method pursued by the health department of the city of New York.

ADDENDA.

The following table shows the details of the cases I have given. It will be seen that a large number of the secondary cases occurred three months and over from the beginning of the primary case.

Many of these secondary cases occurred in other apartments in the same house as the primary case, but were probably not due to contagion from it. It is impossible, however, to say that they were not caused by the first case. I have counted them among the cases possibly due to primary cases. Some of these occurred nearly a year after the first case.

	Total number of cases in streets named.	Number of houses containing cases.	Number of houses containing secondary cases.	Number of secondary cases.	Number of secondary cases in same family.	Number of times two cases reported from house in same day.	Number of times three or more reported from one house same day.	Cases occurring one week or less after primary case.	Two weeks or less.	Three weeks or less.	Four weeks or less.	Five weeks or less.	Six weeks or less.	Three months or more.
DIPHTHERIA.														
Jan. 1, 1888, to Oct. 1, 1889	237	180	37	50	15	7	2	24	8	7	1	0	2	8
Oct. 1, 1888, to Oct. 1, 1889	278	202	43	64	18	11	3	26	7	5	1	2	3	20
Total	515	382	80	114	33	18	5	50	15	12	2	2	5	28
SCARLET-FEVER.														
Jan. 1, 1888, to Oct. 1, 1888	253	191	36	47	18	11	4	25	8	6	3	2	0	3
Oct. 1, 1888, to Oct. 1, 1889	373	262	51	88	27	25	3	36	13	10	1	2	9	17
Total	626	453	87	135	45	36	7	61	21	16	4	4	9	20
MEASLES.														
Jan. 1, 1888, to Oct. 1, 1888	302	183	54	102	23	27	2	18	38	13	2	1	14	16
Oct. 1, 1888, to Oct. 1, 1889	255	178	41	61	14	13	6	17	23	8	1	1	2	9
Total	557	361	95	163	37	40	8	35	61	21	3	2	16	25

XIV.

THE DWELLINGS OF THE LABORING CLASSES IN THEIR RELATION TO INFANT MORTALITY.

By ALFRED T. WHITE, C. E., Brooklyn, N. Y.

The poorly constructed and badly arranged houses, which too frequently have to form the homes of the working classes, have long been recognized as among the prominent causes of excessive mortality, and especially of infant mortality, in many large cities, here and abroad. Although the worst conditions of this sort exist to-day in this country in only a few of the larger cities, symptoms of them begin to appear in many smaller places. It must be remembered that scarcely fifty years ago there had not been a regular tenement-house built in New York city. Another fifty years may as radically change the conditions of scores of other cities, if their inhabitants and their officials are not wise in time. These conditions of life affect not only the health, but the minds and morals, of the people who are obliged to accept them, and are a source of danger outside of the walls of such buildings as well as inside of them.

Much has been accomplished already in New York, in Brooklyn, and in other cities in the way of controlling the plans of new buildings and the alteration of old buildings; and this has no doubt contributed, among other causes, to reduce the average death-rates of such cities. But to find the most conspicuous illustration of what *can* be done in this direction to improve health and lengthen life, we must cross the ocean and take a look at London. In that enormous and still rapidly growing metropolis, sewerage arrangements have long been most difficult; and the water-supply would here be reckoned very scanty indeed. But time and money have been freely expended in investigating conditions and possibilities; and when it was found where money was needed to be spent, it has been expended in heroic measure; and as one result, step by step the death-rate has been reduced to figures which even twenty years ago would have been deemed impossible of attainment. To compare the 18.50 death-rate of London in 1888 with the 26.18 of New York, the 23.23 of Boston, the 22.72 of Brooklyn, or even the 20.72 of Philadelphia, is to suggest to all these cities that there is abundant room for them and for others to advance the conditions which assist to maintain health and lengthen life. And yet at no time has London caught up with its best possibilities, and much less have our American cities approached theirs.

It was about the time when the first tenement-house was built in New

York (1838) that in London a few people began to struggle with the problem of the better housing of the poor. Since then, many individuals and societies have invested millions of pounds sterling in erecting buildings intended to furnish the best accommodations within the rent-paying power of the working classes. Among these efforts, it seems to me the first place unquestionably belongs, equally by its plans, its management, its magnitude, and its results, to the Improved Industrial Dwellings Company, of which Sir Sydney H. Waterlow is chairman. This company has now invested over one million pounds sterling, and has or soon will have accommodations for 5,300 families in its London buildings. Their plans afford an abundance of direct light and air to every room in the buildings, and furnish all necessary sanitary conveniences separately to every tenant. Their buildings are moreover distinguished by the exterior staircases, usually sunk into the front of the building, though sometimes in the rear, and open to the air; so that there is no common interior shaft, staircase, or hall, and no interior communication whatever from floor to floor. Almost all of these dwellings are let to families with children, and the percentage of children to total population must be higher within these buildings than in the metropolis at large. Because of this and of the greater birth-rate we should expect a higher death-rate in these buildings than the average of London, but the official returns of the registrar-general prove the contrary. I quote years for which I have reports at hand.

	Death-rate of the Metropolis.	Buildings of the I. I. D. Co.
1875	23.7	15.2
1876	22.3	16.5
1877	23.5	17.2
1883	20.4	15.5
1884	20.3	14.3
To June 30, 1886,	20.0	13.7
" 1887,	19.0	12.5

Attracted by these figures, at once so instructive and extraordinary, I wrote Mr. James Moore, the secretary of the company, asking for some details regarding infant mortality, and quote from his reply:

> I have had the returns of births and deaths for last year abstracted, with the following results:
>
> Number of deaths under 1 year, 88, or 4 per 1,000 of population.
> " " from 1 to 5 years, 49, or 2.2 per 1,000 of population.
>
> This is for the year to the 30th of June last, during which our total death-rate was only 11.2 per 1,000, the birth-rate being 35 per 1,000.

The buildings erected in London by the Peabody Trust Fund are built on models more like old style houses, but with abundant light and air. Their tenants, about 20,000 in number, average somewhat less in weekly earnings than those of the I. I. D. Co. In the buildings erected by the trustees of this fund, the average annual death-rate in six recent years is 0.96 per 1000 below that of all London. This would be considered a very large percentage in the saving of life were it not contrasted with the saving of 6.3 per 1000 in the buildings of the I. I. D. Co. It would seem that the greater saving in these latter is due to the superior plans of construction, and especially to the outside staircase system. In the reports of the Peabody Fund some interesting ratios of infant births to infant deaths are given, as follows:

Ratio of infant deaths to 1,000 births in

	All London	Peabody Buildings.
1882	151.00	137.41
1884	152.38	138.69
1885	147.87	138.67
1886	158.78	149.48
1887	157.92	140.66
1888	146.44	126.87

an average annual saving of 13.77 in the ratio of infant deaths to births. Reckoned per 1000 of population of all ages, the death-rate of infants under one year shows in all these buildings a slight excess over the same ratio for all London; but reckoned per 1000 of infants living, it is decidedly lower than the outside average. The unusual proportion of young children in these improved dwellings is, of course, balanced by a lower adult proportion. Hence, while we find an infant death-rate nominally a trifle above the average of London, we find a death-rate for those above one year old scarcely over one half of the corresponding average for the whole metropolis. It is unfortunate that we cannot compare the deaths under one year, under five years, and above five years, with the number of living of *same ages*. Such a comparison would, in my judgment, show that of the lives saved annually to the occupants of these improved dwellings, half or more than half were saved under five years of age.

Those interested to see buildings constructed as closely to these best London models as differences of climate, building materials, and tenants' wants allow, can find them here in Brooklyn in the "Tower Buildings," at the corner of Hicks and Baltic streets, where accommodations for 1,000 to 1,100 people have been in use since 1878; or can see similar buildings in course of erection at the foot of Joralemon street. The tenants of the Hicks Street buildings are usually perfectly willing to show their apartments to visitors, if the hour be convenient.

A record of deaths in these Brooklyn buildings has been kept by the agent, but it is quite possible that deaths occur without his being advised or hearing of them; and a population of 1,060 is moreover too small to furnish reliable averages. It was my intention to make a close comparison of the ratio of children dying to children living in these blocks, and in the neighboring blocks of old style tenement-houses; but it has been practically impossible to obtain figures of the population of these other houses, as there has been no census here since 1880, and the health officers have felt themselves powerless to secure the information desired.

In the city of Brooklyn at large the annual deaths of children under five appear to average between 9 and 10 in the hundred of those living within same ages, while in these buildings it is between 6 and 7, according to the agent's figures. In old style tenements of about the same size in New York, the board of health figures show a corresponding rate of 11.4.

It appears from the death records in these Brooklyn buildings that there is no instance in which a contagious disease has been communicated to apartments adjoining, or above or below. These diseases, of course, enter there as into the best guarded private houses, but the outside staircase has so far provided all necessary isolation, while in ordinary houses used by several families the stairway hall is as natural a vehicle for the communication of disease as for that of sound, smells, or flames.

Cholera infantum, that product of summer heat, may be lessened in improved buildings, in so far as abundance of air, as fresh as it is to be had in the city, is furnished by through ventilation from front to rear in every apartment. But fresh air is not to be had in the city after days of high temperature, and the effect of the hot weather on infants is even greater than the statistics of death show; for these ratios are made upon the basis of winter population, while in our largest cities thousands of little children, whose parents are well to do, spend every summer out of town.

In every direction there is need of more accurate statistics concerning present conditions and the results of experiments in remedies. It seems to me that in every large city an account should be kept with each street, each block, each house. Its population needs to be accurately known, and it might be charged as in a ledger account with its deaths. Such figures may seem dry to thousands of people who ought to be interested, but they mark the distance advanced, and point the forward road. Every city ought to take advantage of the coming United States census to secure from the government officials a copy of its census-roll, house by house.

The death-rate of all our cities ought to be reduced and can be reduced five in the thousand from present figures, and at no distant day. In fact, it appears from the results already achieved that improved building construction might alone accomplish this; certainly it can be made a potent factor in producing such a result.

XV.

CAUSES AND PREVENTION OF INFANT MORTALITY.

By JEROME WALKER, M. D., Brooklyn, N. Y.

It is believed by many that the ratio of infants' deaths to the whole number of deaths in any community is a test of the healthfulness of that community. It has been repeatedly said that the public administration of sanitary measures in any city or town can be judged, as to its efficiency, by the rate of infant mortality in the city or town in question, and that a decrease in the mortality of infants means more efficient health authorities than hitherto. When I agreed to read a paper before this Association, it seemed an easy matter to show that infant mortality has decreased of late years in this country, owing to an increased efficiency of health boards and other sanitary associations; but a study of statistics does not show either that the mortality has decreased in the country at large, or that the efficiency of health boards in general has increased sufficiently to be a strong factor in effecting a decrease. Notwithstanding these conclusions, the prevalent high death-rate of infants, *i. e.*, of children, during the period of the first dentition, is not a reflection upon sanitary science, for wherever the science and art of preserving health have had a fair chance, infant mortality has been reduced. We may agree with Dr. H. B. Baker, of Michigan, who says,—"I have no hesitation in subscribing to the belief that much of the infant mortality could be prevented by thorough and enlightened action by local boards of health in cities and villages." But we all know that this sort of action will not be taken until by civil service, or otherwise, men best qualified for positions on such boards get them, and will give that personal attention to sanitary details that the mere political doctor will not do. Sanitary science will not have a fair chance until personal attention of qualified persons to sanitary details can be had; and this cannot be, in some cities, with the meagre appropriations made for the execution of health laws. The outlay for proper sanitary work seems enormous to the tax-payer; but a proportionate result justifies the expenditure. In my opinion the rapid advance that will be made within the next ten years in sanitation, and the training that the people will undergo, will materially lessen infant mortality. As an evidence of this are the following facts: In Brooklyn, in 1878, the population was 531,100. There were 11,075 deaths from all causes. Of these deaths 5,294 were among children under five years of age, and 2,943 of children under one year. In 1884, the population was 644,526; total number of deaths 14,116; of children under five years of age, 6,271; under one year, 3,924. In 1888, the population was 794,682; total number of deaths, 18,061; of these 4,944 were among children under one year of age, and 3,075 of children between one year and five years.

Mere statistics in regard to the relative rate of infant mortality are misleading, for an epidemic of diphtheria, whooping-cough, or scarlet-fever, a very hot summer, or a chilly springtime, may increase the mortality out of all proportion, and still health boards cannot be held responsible. We must look in the main to parents, guardians, the general medical practitioner, for better results.

Infancy, under the best circumstances, is a period characterized by great tenderness and almost frailty, of rapid growth, commencing development, and of extreme susceptibility to impressions from within and without the body. In this age of thought, struggle, worry, insomnia, nervous hyperaesthesia and nerve tire, babies participate to too great an extent. The baby born of nervous, excitable parents, has to contend at great odds with its environments. If so called civilization did not bring new factors in disease into the field as the population and wealth increase, sanitary science by this time might have reduced in our cities the death-rate of infants under one year of age, from one fourth of all the deaths to about one eighth or one tenth, or of children under five years of age from one half to one fourth. As improved methods of preventing disease have appeared, new disease producing agencies have contested the ground inch by inch, so that the hope of the future resides in the sanitary education of the masses.

Some one has said eternal vigilance is no less necessary for the maintenance of liberty, than for the maintenance of the health of children. To rear a child nowadays so that it shall have a healthy mind in a healthy body is more difficult, probably, than it was fifty years ago. As wealth increases, poverty increases, and the susceptible baby suffers. Worry, anxiety, insufficient food, over feeding, insufficient sleep, coddling, exposure, all bring with them dangers to health. Among the causes of sickness which seem to be growing stronger, are the overheating of houses, frequently with air deprived of moisture and ladened with gaseous impurities from contact with cracked and over-heated furnace pots; over-feeding with prepared baby foods, sweet crackers, and dainties; the relegation of the care of children to nurses, many of them tricky and incompetent; an increased susceptibility to nervous complications and disorders; and artificial feeding instead of natural nursing by the mother. "Why," asked the late Prof. Charles Buckingham,[1] "do American born females make such poor wet nurses compared with the immigrant from Ireland or Germany? After nearly thirty years of practice I cannot answer the question. That it is a fact, few practitioners in our large towns and cities doubt. . . . The consequence of the early failure of the supply of breast milk is the early attempt to fit the stomach for other food. Add to this the parental pride which interferes for the poor pleasure of seeing a toothless child swallow the food of an adult, and you have for the result cholera infantum, dysentery, convulsions, tabes mesenterica, and if by reason of extra strength the child passes the first dentition, it is more likely to be cut off during the second, or to become later a dyspeptic, or even phthisical. . . . The fact has become more and more apparent that large numbers of women cannot nurse their children, and those who are beginning to, constitute the exception. Formerly this inability was not so common, occurred only occasionally, and when partial did not attract attention."

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[1] Annual Discourse before the Mass. Med. Soc., June, 1873.

Take this true statement of Dr. Buckingham in connection with the following extracts from the writings of Drs. Nathan Allen and Elisha Harris, together with the fact that a considerable number of physicians nowadays advocate, for various reasons, artificial feeding in preference to natural nursing, and we have an important factor in the increase of infant mortality, and one which boards of health cannot well reach.

"The type of a good nurse," says Dr. Allen,[1] "is a woman with a sound and healthy body, evenly balanced in all its parts. There should not be a disproportionate development in any of the organs or systems of the body. Heredity, and the mode of living of the average woman, produce an excess or deficiency in nervous or muscular force, and an undue development of the lymphatic organs. Among the causes are educational pressure, constant excitement, depression of spirits, too much society, hard work, great exhaustion, &c."

In 1874, Dr. Harris wrote to a special committee of the Board of Supervisors of Kings county, as follows: "The three great private charities in New York city that receive newly born infants, and also provide to some extent lying-in wards, admit in the course of the year about 1,900 newly-born infants. The rate of mortality in the groups of infants whose mothers (however poor or however young) tarry to nurse their offspring, has been during the past four years just about 14 per cent., while in the hired wet nurse class, the rate of death averages about 27 per cent., and in the strictly foundling and orphan class that are bottle-fed or spoon-fed, the rate is 70 per cent. dead in the first year, and 90 per cent. before the end of two years."

The causes in general of infant mortality are,—1st, hereditary, viz., syphilis, scrofula, tuberculosis, excessive nervous irritability, &c.; 2d, those due to the child's environments, too little or too much care, exposure or over-protection, insufficient or too much food. These causes result in dyspeptic ailments, intestinal disorders, contagious diseases, marasmus, convulsions, capillary bronchitis, pneumonia, &c. While "general debility" is not considered as a separate and distinct affection, the term is a convenient one to use to designate that condition which follows, especially in our cities, many cases of intestinal disease, whooping-cough, measles, scarlet-fever, and diptheria, or that is in the child at birth. Muscular and nervous debility are too frequently associated with the ailments of children nowadays. This being so, there is more need of recuperation in the summer than heretofore.

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[1] American Journal of Obstetrics and Diseases of Children, April, 1876.

Owing to the increasing number of physicians who are carefully studying children and their ailments, to the better stand Pediatrics is assuming in connection with our medical colleges, and to popular information as to the care of children furnished by reliable journals, we trust that in the future flabby muscles and uncertain nerves will be rare among children.

But this time can be reached only by a better sanitary education of families, by more clearly outlining and insisting upon the power of health boards being exerted, as sanitary science has a right to expect it to be, and by the proper conduction of institutions for children,—for the children's welfare and not for the glorification of the trustees.

Parents in general are better acquainted with sanitary measures than was the case even fifteen years ago, but there is much that is published in newspapers and magazines under the head of hygiene that is unreliable and productive of harm. Such statements might well be contradicted by committees on hygiene of county medical societies. Reliable information should be furnished in *all* schools by competent physicians, and much of what is there taught will be repeated by the pupils to their parents, and so the good seed will grow and develop. I have lectured long enough in the public schools of Brooklyn to recognize the advantages of plain, earnest, interesting talks on health topics, when like most teachers I had been despondent of good results. I have been called to attend, professionally, the sick babies of former pupils, and have been surprised to find how readily and intelligently the young mothers appreciated directions. "Yes," they would say, "we understand how important these things are. You used to tell about them in your lectures."

Health Primers and treatises of any considerable size do not find their way into most homes. Cities might, to advantage, spend considerable money to enable boards of health, or sanitary associations, gratuitously to distribute, where most needed, sanitary tracts. Those designed several years ago by the New York city board of health, upon "the care of babies in hot weather," were to my knowledge treasured in many a house. Directions as to disinfection might well be given by physicians to families needing them. Health inspectors, if the right sort of men, can do much by personal information.

Inspector F. H. Colton, of the Brooklyn Board of Health, in 1876, puts this in a forcible way:

> "Disease and death are born of the ignorance and sloth which find a familiar home in tenement houses. It is the young life, especially, which they attack, and hecatombs of dead babies, in summer and winter, testify with what fatal effect. How to correct the modes of living among the ignorant poor is a problem demanding the wisest thoughts of the wisest minds, because this would be to reach the roots of the fearful mortality among them. Tenement-house laws and health ordinances have their place, and should be enforced; but these only reach the border-land, as it were, of the difficulty. Within the apartments where the family life goes on is where the laws of health are really broken.
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> It is here, I conceive, that a health officer finds his most important function. It is his, by repeated visitation, by wise suggestion, by personal influence, by creating the conviction that he is a friend, so his coming will be welcomed and his advice heeded—by all these, and any other means at command—to reach, impress, and control the minds of the ignorant masses."

Parents can be taught how to sterilize milk; why and how litmus paper should be used as a test for acidity of milk; the value of cereal foods, how they should be cooked and how made palatable; the evils of an excessive use of sweet crackers, animal crackers especially; how frequent head-to-foot ablutions (as Mr. Edwin Chadwick calls these baths) aid in the maintenance of health and the prevention of sickness; how bed-rooms and living rooms can be easily ventilated; why garbage and excrement should not remain in and about the house to offend the senses of sight and smell and to poison the atmosphere; why food should not be kept in bed-rooms or bath-rooms and near water-closets; why diapers and underclothing soiled with urine should not be dried by the fire in the living-room; what is the use of vaccination; how proper preparation and cooking will render certain cheap, coarse, and tasteless foods nutritious and palatable;—some families might ignore or repel these and other practical suggestions, but many would welcome them.

Boards of health can and should see to it that the drinking-water is ample and good; that milk is at least quite pure, and not furnished by cows fed on sour garbage or distillery slops, and kept in unhealthful stables; that house garbage is promptly removed; that plumbing is as it should be; that the sewers are properly flushed and disinfected; that contagious diseases are studied, and their spread prevented, so far as possible, by isolation and notification to the people; that houses are not overcrowded; and that every facility is afforded for the building of model tenements. The hard working, conscientious health officer has a wonderful opportunity to save life, and increase the comfort and usefulness of the people.

If the whole of parentage does not consist merely in loving one's child, but in good blood or heredity, proper food, intelligent care, and untiring devotion, the more frequently we can use these factors in the management of institutions for children the better, and the smaller will be the mortality. But what do we find in too many institutions? We may say of some of them as Florence Nightingale did, in 1863, of hospitals: "Strange though it seems, it is yet quite necessary to lay down the principle that the very first requirement in a hospital is that it should do the sick no harm." There is over-crowding, partly because of a desire to outrival in numbers similar institutions, partly because of insufficient means to extend accommodations, and too frequently because of a niggardly economy which prohibits a proper supply of food, the employment of intelligent and faithful attendants, and the expenditure of sufficient money to provide proper ventilating and bathing facilities. Though many of the inmates of these institutions come from the lower walks of life and may not have had the best of care at their homes, there is no excuse for cutting off a necessary supply of milk, the most valuable food of childhood, because it is agreed that the expense of running the institution must be lessened. Neither is it right to have the floors wet or damp a large part of the time, in the attempt to have them clean. On no ground other than selfishness can the practice be defended of sending children, who are expected to die, out of an institution so that the published death rate of the institution shall be small. Such action does not prevent death, but often accelerates it. For what, pray, are institutions for children established, unless to care for the feeble, sick, and dying, as well as for those in health, and to give decent burials if necessary? Careless and prolonged bathing of puny infants in cool or damp rooms is responsible for many a death from capillary bronchitis. Hard and uncomfortable beds, often teeming with vermin; a scarcity of towels and handkerchiefs; the placing of children with gastro-enteric affections, it may be, in the same room with babies having purulent ophthalmia; the insistence upon one woman wet-nursing two infants, or having charge of fifteen or twenty little children, a job sufficient to tax the energies of three or four women; the persistent and often underhand opposition to the directions of qualified and fair-minded medical attendants, whose sole aim is to diminish by every means possible a high rate of infant mortality,—all of these things are hindrances to the maintenance of health. The bane of too many institutions is too many trustees, and there is a clashing of directions. For example: In one institution a lady director ordered the superintendent to give but little butter to the inmates. A few days afterwards another director ordered that the butter be given in larger amount. Some of the trustees are men and women who either have sought the position, or have allowed themselves to be elected for the sake of notoriety or to while away time which hangs heavy on their hands. Generally these people know little about children, and care less. Under their rule, the visiting or house physicians either have too much power given them, or their professional opinion is considered of little value. How often have physicians been dismissed, or asked to resign, because they have ventured, though in a gentlemanly way, to enter protests against measures which they know to be inimical to health. It is safe to say that where physicians to institutions have had a fair chance, infant mortality has been reduced, and whenever they have been hampered by conflict of authority, by unjust limitations, by an unwise economy, the mortality has been increased. In an institution in this city having one hundred and eighteen children under two years of age, *six* only died in one year. This small mortality was due to ample accommodations, good nurses, an intelligent matron, and a just appreciation of and reliance upon the medical staff. So valuable are the services of the physicians considered, that in addition to the annual stereotyped thanks for their gratuitous services, their services are reckoned in the list of donations as annual gifts of so much money value.

The late Prof. Dunster, in his report of 1870, showed that owing to no over-crowding, fewer epidemics, and better hygienic conditions, infant mortality at the Infants' Hospital, Randall's Island, had fallen, in 1868, '69, and '70, from 55.06 per cent. to 46.83 per cent., and then to 36.41 per cent. He believes that unpaid labor is very expensive, and deprecates pauper labor in such an institution, for it does not furnish the "unremitting, judicious, and proper care that is needed."

In this connection it is well to state the conclusions of the late Dr. Elisha Harris.[1] "The private institutions can save 85 per cent. of mothers' infants, and 65 per cent. of hired wet-nurse infants, as those institutions are now managed, and it is possible to do much better. . . . The mortality in children past 1½ years of age ought not to exceed 5 per cent. in those under 5 years of age, and 3 per cent. of those between 5 and 10 years of age. . . . If in any alms nursery the rate of mortality exceeds 22 per cent. of the infants under a year, 10 per cent. in the infants between 1 and 2 years of age, and 6 per cent. in those from 2 to 5 years, and over 3 per cent. between 5 and 10 years of age, there is culpable fault somewhere, and such faults are of the kind that make puny children, and insure an increase of pauperism and public burdens."

We may conclude from what is known of institutions for children,—

1. That a large proportion of the deaths in them are preventible.
2. That the younger the children and the larger the number the greater the mortality.
3. That the mortality can be lessened, but the decrease costs money, time, patience, and energy, and to obtain the best results the attending and resident physicians should be reliable, should be given control over all medical and sanitary matters, and should be held responsible for the same.

In 1874, Dr. Henry Hartshorne and J. M. Toner proposed summer camps, especially for feeble poor children, as an aid in decreasing the high mortality among young children. It was a question, when the proposition was made, whether mothers would be willing to leave their husbands and homes, even in the hope of improving the health of their sick or feeble children. In 1875, acting upon the experience of charitable people in Copenhagen, some good people of Boston started what was known as the "Country Week"—the sending of poor children for a week's outing to farm-houses in Massachusetts. Since 1874, cities, societies, churches, newspapers, and individuals have instituted "fresh-air funds," summer resorts, and seaside homes for poor mothers and their feeble children. Very little trouble has been experienced in inducing mothers to go for a week or two with their children, or to allow children to go by themselves, to the seaside, the country, or the mountains. The husbands, for the most part, have come to see how much is saved in various ways by these trips, and so great is the rush by applicants, that the question now is, How can we reach those who need the change most, and how exclude the others? A real danger faces all these efforts to help the masses — the danger of overdoing. The charitably disposed, the philanthropic, the lovers of children, the emotional, people of wealth and leisure, struggle to have a large sanitarium, the largest, if possible, and many donors or trustees or helpers have one or more families in whom they are especially interested, and for whom they are positive the charity was established. Doctors are employed at a small pittance, or are allowed to give their services, to show that medical attendance is furnished when necessary; but "change of air" is popularly believed to be all that is needed. The physician is not looked upon as a sanitarian, his highest function, and sanitary matters are relegated to irresponsible people. Large sanitaria become unwieldy, and are machines, unable to give the true mother-like care which babies need. Better would it be for the babies if there were more sanitaria, and smaller. Properly conducted summer health resorts must help to lessen infant mortality, though it would be hard to prove this statement by figures. A week's freedom from home cares and work, with pure air, an abundance of food, good sea-bathing, opportunities to ride, etc., frequently brings the milk into the breasts of women who at their homes had insufficient nourishment and could not nurse their children. Mothers are taught the value of digestible, plain, wholesome foods, of regular times for eating, of cleanliness, to discard feeding-bottles with long rubber tubes,—"snake" tubes, as some one has appropriately called them,—to appreciate proper airing of rooms, that bathing not only makes a baby sweeter, but healthier. As I look back over my ten years' experience in connection with a seaside home for children, I can recall to mind woman after woman who has learned to be neat, clean, orderly, sensible, not all in one season, but after several visits to the seaside home. Every woman so trained must, by the influence of her example, lessen, to a certain extent, infant mortality in the circle of her acquaintances.

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[1] Letter to Investigating Committee of the Board of Supervisors of Kings County, etc., 1874.

Any one who has lived in winter in a light, well ventilated, but well warmed tent of generous size, or who has camped out in summer in a well arranged, comfortable, airy tent, must feel that tent-life could be readily and advantageously used for feeble and puny children of our cities. And this tenting need not be at a considerable distance from a city, but upon suitable lots or lands, which are frequently to be found within or near to the city limits. It behooves those acquainted with living in properly arranged tents, to advocate camp life, and to overcome popular prejudices as to tents, founded sometimes on unpleasant experiences in dilapidated and badly arranged tents at camp-meetings and other resorts. Large piers which project into our rivers and bays, portions of our public parks, and anchored vessels in mid-stream, might well be utilized as sleeping-places on hot summer nights when sleep is the principal factor in the recovery of babies that are ill. How much more good could be accomplished by St. John's Guild, if its barge had its inmates on the water for several days instead of for one day! What sanitaria the large iron ocean piers would make! To my mind one of the most important steps towards lessening infant mortality has been made by Dr. Sarah J. McNutt. In the summer of 1888 she fitted up a house in a *crowded portion* of New York city, as a *city* summer sanitarium. Of the 108 babies received, *all sick*, 79 were under one year of age. Of this 79, 32 died, 22 of the deaths being in July, August, and September. Dr. McNutt says,—"Although that experience covers as yet only one summer, it seems to us to demonstrate that bottle-feeding is not necessarily fatal, even in a hospital, and that a hospital for sick babies need not be a place for the production of autopsies alone." She shows that the *quality* of bottle-feeding has much to do with infant mortality, and that to obtain the results she did, hygienic measures were of paramount importance. The cost of maintenance of each patient in the babies' hospital, per week, was *four* dollars, a larger amount than most institutions care to acknowledge to the public. Dr. McNutt rightly deprecates the false economy in the management of many institutions for children. "A word," she says, "should be added in regard to the nursing in our hospital. We do not expect a single nurse to take care of a whole wardful of sick babies. The nurses are especially trained in the hospital for this work, with an average of one nurse to every four patients during the day, and one to every eight patients during the night. Further, we do not try to reduce our expenses to the lowest possible cost, but, relying upon the liberality of our patrons, put the patients' welfare ahead of every other consideration."[1] This care, gentlemen, is what we all would bestow on the sick of our own households. Why not in public and private institutions? The very trustees who begrudge an increase in salary to over-worked employés, will willingly pay any amount to bring their own darlings back to health.

In this age of competition, nervous excitability, and undue excitement and restlessness, many of the babies of the middle classes and of the well-to-do need, in the heat of summer, quiet, change of air and scene, and frequently medical and sanitary supervision. Tired mothers need all this for their own sakes as well as for their babies, and hotels and boarding-houses cannot supply, and often do not care to supply, these necessities. At the present time it is easier for the poor to have their feeble ones properly cared for at the seashore or in the mountains than it is for the well-to-do.

In whatever private sanitaria that are opened, the dangers of overcrowding, insufficient drainage, a meagre or poisonous water-supply, poor cooking, inefficient help, and unhealthful location may accelerate infant mortality instead of preventing it.

Dr. Henry Hartshorne gives it as his opinion "that among children born with normal constitution and under entirely favorable circumstances, the mortality ought to be less than at any other period of life." But how often do we see the "normal constitution" and the "entirely favorable circumstances"? Very seldom. "Line upon line, precept upon precept," an unflagging and judicious sanitary supervision of our children from their birth until we or they are called hence, will, above all things else, decrease infant mortality to the minimum. On the other had, injudicious sanitary supervision, the watching of almost every mouthful of food a baby takes, constant anxiety lest the child is going to catch cold, the dread that the blood will be over-heated by much exercise, etc., will be likely to worry both parent and child into an untimely grave.

[1] Medical Record, March 2, 1889.

XVI.

THE CAUSES OF INFANT MORTALITY.

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The most exalted function of the physician is to maintain health rather than to remedy disease. That chair which, in the curricula of the colleges, is most deserving of dignity, and still is most commonly conspicuous by its absence, is the chair of preventive medicine. The business of our profession is the conservation of human life, and yet upon the very threshold of the task we encounter one of the most perplexing of vital problems—the fact of infant mortality.

Few of us, I fancy, appreciate to the full the extent and meaning of this fact. We entertain the general idea that infancy is hedged about with seemingly inevitable dangers, while we have but a vague notion of the relative activity and the ultimate origin of those influences which determine the fatal results. And, if we seek to prosecute anything like an analytic inquiry into the causation of infant death, we find the effort impeded by obstacles very difficult to overcome.

The indifferentism of a certain class in the medical profession and among the public at large stands in the way. These *laissez faire* philosophers admit the fact of an excessive mortality in infancy, but they hold lightly the value of infant life. They give to the loss a Malthusian meaning and profess to regard it as one among the many evidences of superfluous generation. But the analogy is not well taken. Nature *is* prodigal of her growth in the germ, but she is *not* wanton of her finished work. She scatters seeds by the million to the wind, where but a thousand take root and germinate. She hatches out one fish where the possibilities of hundreds have been spawned. She matures a score of Graafian follicles in the human ovary for every ovum that is fructified and fully developed. But at *that* point—the point of *birth*—the parallel stops. With the appearance of the individual existence, the worth of life begins and reaches its highest standard in the human. Endangered it is from "foes without and foes within," but nature immediately strives to throw around her completed product every protective influence. From birth, the *vis medicatrix naturæ* becomes not merely a latent but an actual force. Thereafter every new life, with its freight of possibilities, has an economic value; every sacrifice of it is an economic loss.

But a still more serious obstacle bars the progress of the inquirer into the causation of infant mortality, viz., the poverty of our vital statistics.

In this regard the Old World is immeasurably in advance of us. Our records of birth are altogether imperfect. Our nomenclature, our classification, our methods of tabulating death causes are in a most chaotic state. There is no uniformity among them. We permit ignorance to hide behind such unscientific terms as inanition, infantile debility, marasmus, asthenia, dentition, indigestion, scrofula, heart-failure, and the like. We confound methods of dying with causes of death. We commonly overstep the physiological bounds of infancy—limited naturally, by the complete evolution of the deciduous teeth, to three years—and include children up to the age of five in the records of infant mortality. In fact, only thirty American cities pay any attention even to this artificial boundary line of years in making up the sum-totals of death, while only nine cities consider the element of the age of the decedents in tabulating the returns of individual death-causes. The American Public Health Association would do a signal service to the public if it should appoint a committee to frame a satisfactory table of mortuary statistics and to secure the adoption of the same by state and local boards of health.

It goes without saying, that accuracy, in such an inquiry as this, is thwarted by these failures in the artificial returns of death. We are confined, of necessity, to the larger group of statistics I have noted for a discovery of the percentage of infant mortality in the gross; and are forced, even then, to accept the returns for the first five years of life instead of for the first three; while, in the endeavor to determine the individual diseases which result fatally in infancy, we are restricted to the smaller group of nine cities. In a recent address, which he had the honor to deliver before the Minnesota Academy of Medicine, the writer succeeded in approximating some degree of accuracy in the returns from twelve American cities; but in order to secure an absolutely correct estimate, it has proved necessary to narrow down the present summary still more.

While it is measurably true that the death-rate of cities is modified to some extent by that of the country districts, yet population is concentrating itself so rapidly in great centres that this is less true than in earlier times; and, for all practical purposes, the urban statistics are a safe index to the facts.

A study of these statistics in the thirty selected cities to which I have referred shows that, during the year 1888, 155,208 deaths occurred in these places. Of this number, 40,715, or over 26 per cent., were under one year of age; while 23,776 more, or over 15 per cent., were under the age of five, making a total of 64,491, or 41.5 per cent. After a fair estimated subtraction for the number of decedents who ranged between three and five years of age, we can safely estimate that 35 per cent. of this sum total come within the physiological limits of infancy. This figure accords very closely with the reckoning of a number of other statisticians, and coincides curiously with the calculation that nearly 35 out of every hundred babies born die in infancy.

These cities are sufficiently variant in size, climate, and geographical situation to afford a fair average in death-rate, and they establish, beyond a question, the truth that modern preventive medicine has not reached a remedy for the excessive loss of infant life. This fact duly recognized, the more difficult task awaits us of determining the immediate and ultimate causation of this mortality.

It will not be enough to discover the names and relative fatality of the diseases which destroy the human race in its earliest years. This is a comparatively simple thing to do, even in the face of our statistical failures. But the weightier question remains and hides the solution of the whole problem of infant mortality. Why is infancy peculiarly liable ot the destructive influence of these immediate death-causes? In the correct reply to this important query rests the final recognition of the ultimate causation of infant-death in its present overwhelming excess. The road to the last analysis of the problem must, however, lie through a primary analysis of the immediate causes.

The nine cities, whose published reports enable us to determine the classified age of their decedents in each individual death-dealing disease, are New York, Baltimore, Boston, San Francisco, Cincinnati, St. Louis, Newark, Hartford, and Minneapolis. In the year ending October 1, 1889, the combined statistics of these cities give a death-total of 22,092 infants under one year, and of 12,883 children between the ages of one and five. The sum of these figures gives 34,975 so called infants who have died within the year.

The diseases which have induced these fatal results are as follows:

Diphtheria	2,653
Membraneous croup	974
Scarlet-fever	1,257
Measles	752
Whooping-cough	1,004
Bronchitis	2,380
Pneumonia	2,974
Pleurisy	7
Cholera infantum and diarrhœa	5,214
Gastro-entero-colitis	2,510
Marasmus, etc	2,998
Convulsions	1,929
Meningitis	1,685
Cerebral congestion	736
Phthisis	300
Tubercular meningitis	113
General tuberculosis	26
Tabes mesenterica	56
Hydrocephalus	274
Syphilis	81
Congenital malformation, etc	772
Miscellaneous causes	6,280
Total	34,975

This general statement demands a brief analysis, and these causes a general classification.

Under "Miscellaneous Causes" we find a variety of diseases which seldom appear, and more seldom result fatally in true infancy, while probably two thirds of this total, in which these rarer death-causes are included, is made up of still-births and premature births, which should not be, but almost always are, reckoned as actual deaths.

Under the term "Congenital Malformities, etc.," are included cyanosis, atelectasis, trismus nascentium, umbilical hemorrhage, melaena, spina-bifida, enormities, and other conditions which terminate life within a few hours or days of birth. This class should probably be increased by some further contribution from the "miscellaneous causes."

The small number of infant deaths charged up to syphilis would excite surprise were it not for the well recognized fact that physicians habitually save the feelings of their patients' families by concealing the nature of this disease, as a death-cause, under the guise of some local disturbance incident thereto. It is a misfortune to the public that a cause so unquestionably potent and so frequently occurrent should be thus obscurely hidden.

With the deaths attributed to hydrocephalus and to tabes mesenterica are inextricably grouped, by some statisticians, many cases of so called marasmus, while with the latter disease are included similarly a few deaths from tabes and hydrocephalus. Admitting that it is difficult to classify these conditions and that they sometimes interact upon each other; that it is now true that hydrocephalus has a syphilitic origin, and again that it has a tubercular character,—it is nevertheless improper to place that large variety of conditions, which we conveniently term marasmus, in association with either the one or the other of these two well defined diseases.

For convenience of future criticism, it will be well to resolve these diseases into several well defined groups, as follows:

(1) Contagious Diseases Including diphtheria, membraneous croup, scarlet-fever, measles, and whooping-cough.	total,	6,640
(2) Respiratory Diseases Including bronchitis, pneumonia, and pleurisy.	total,	5,361
(3) Tubercular Diseases Including phthisis, tuberculosis, tubercular meningitis, tabes mesenterica, and hydrocephalus.	total,	769
(4) Congenital Diseases, etc. Including syphilis, malformations, etc., still-births, premature births, and other miscellaneous causes.	total,	7,133
(5) Nutritional Diseases Including cholera infantum, diarrhœa, gastro-entero-colitis, and marasmus.	total,	10,722
(6) Nervous Diseases Including convulsions, meningitis, and cerebral congestion.	total,	4,350

This classification puts us in a position to discuss these groups of diseases in their relation both to the immediate and remote causation of infant mortality.

And, first, the contagious diseases, which represent about 19 per cent. of the entire death-rate of infancy. Over one half of the fatalities in this group are chargeable to diphtheria and membraneous croup, which may safely be regarded, so far as the statistician is concerned, as identical diseases. The significance of this percentage is enhanced when we observe that these are preëminently the fatal members of this group, so far as true infancy is concerned, and that scarlet-fever, measles, and whooping-cough find the vast majority of their victims in children between the ages of three and five. Of this remaining trio, it might be something of a surprise to the casual student of vital statistics to find whooping-cough playing so large a part and really destroying a greater number of actual infants than scarlatina and rubeola. That measles, too, a disease ordinarily regarded in so innocent a light and rarely quarantined, should yield so large a number of fatalities as it does deserves emphasis. Doubly true is this when we remember how common a sequel or concomitant of measles is capillary bronchitis and give due weight to the fact that a large part of the numerous deaths debited to the bronchial disease should be charged to this primary cause.

And this naturally leads us on to the reflection that the members of our second group, the respiratory diseases, are very definitely related as sequelae in infancy to the exanthemata. This conclusion is borne out by the fact that, where the latter thrive, the former are always prevalent; and that whenever the one group assumes a marked degree of statistical importance, the other group keeps pace with it. And let us mark, very carefully, that of both classes is it true that they appear and multiply, in occurrence and fatality, not merely in direct ratio to the increase of the population, but in direct proportion to the *massing* of the population within a given area. This is due not only to the opportunity which close crowding of the people gives for the spread of contagion, but also to the correlative truth, applicable to all diseases alike, that reduced cubic space per capita, involving the worst of insanitary consequences, means a reduction in the powers of resistance in the people and, particularly, in the infant so environed.

And here we touch the first key-note in this social discord of infant-death—the first suggestion of its ultimate causation. It is *not* true that infant life, under favorable averages of environment, is unequal to the task of maintaining itself against disease; but it *is* true that infancy, prejudiced in the unequal struggle with insufficient air-space and sunshine, easily goes down under the attack of disease.

The remarkable number of deaths assigned to pneumonia, coupled with the fact that this malady, in its true form, is not ordinarily considered a foe to infancy, gives rise to a suspicion of carelessness in diagnosis, and of a probability that a large part of this total should be added to that essentially infantile disease—capillary bronchitis. It is also certainly true that a considerable share of cases reported as pneumonia are in children between three and five years—when the advancing age renders the diagnosis more probably correct, but carries the disease further outside the proper limits of the causation of truly infantile mortality.

True pneumonia—unquestionably a germ disease—is, so far as it affects true infancy, most prevalent in closely crowded communities and the fact reëmphasizes what we have already said upon this subject. European cities are taking long strides in the direction of providing better houses and more cubic space for their less fortunate inhabitants, and the great cities of the United States must, sooner or later, grapple with this same necessity.

Of design, the writer has recorded the fact that, in the statistics of the nine cities under discussion, only seven cases of pleurisy, occurring and terminating fatally in infancy, are recorded within the past year. Now pleurisy is a disease to which infancy would be much more probably prone than to pneumonia ; and, without doubt, it occurs with some degree of frequency. Dr. C. D. Conkey, of Larimore, Dakota, has, in a recent timely paper, drawn attention to the somewhat frequent occurrence of empyema in infancy and to the equally frequent errors in the non-diagnosis of the disease alike in its acute and chronic form. The suggestion is at least worthy the attention of the profession.

So far, then, we have noted three diseases, which are peculiarly fatal to infancy—diphtheria (including membraneous croup), whooping-cough, and capillary bronchitis. Between the two latter a natural relationship exists, for in whooping-cough death usually results from complicating bronchitis. At first sight, no pathological connection of these maladies with diphtheria is apparent ; but if we pause to consider the usual mode of death in all of these conditions, as affecting infancy, we find a suggestive link, which may, to a great degree, account for their common fatality and give us a clue to another ultimate agency in the mortality of this period.

Death usually occurs in all of them by suffocation rather than from exhaustion or blood-poisoning. It is in later years that these latter modes of death more frequently prevail. It is suffocation, incident to the blocking of the larynx or trachea in diphtheria, or of the capillary tubes in bronchitis, with or without whooping-cough, which commonly destroys the infant. The narrow lumen of the air-passages and the inability of the babe to keep them free of obstruction, are the main factors in this result. If these points are well taken, they are valuable ; because, while affording another primary reason for the excessive mortality of infancy, they offer a hope of lessening this fatality. The introduction of mechanical aids, by means of the operation known as intubation of the larynx, to which Dr. O'Dwyer, of New York, and Dr. Waxham, of Chicago, have contributed so ably, marks, I believe, an era in the treatment of the diphtheria and croup of infancy. It cannot be practised too early, after the invasion of the larynx by the disease, if it is to avail in averting the dangers of death by suffocation.

It is matter for regret that the seat of the lesion in capillary bronchitis does not permit of any hope that similar means will prevail to lessen also the mortality of this disease. But, nevertheless, the point of relationship in the mode of death suggests new possibilities of adaptation of the old methods of treatment. No case, however desperate, should be readily abandoned to its fate. By the brief but timely aid of an emetic, by the careful use of diluted oxygen, by the admission, in the neighborhood of the child, of currents of fresh air, by the stimulating effect of dashes of hot and cold water upon the chest, and by the use of other agents which will promote the temporary clearance of the tubes, the mechanical obstruction which is fast destroying life, by cutting off the air-supply from the lung-cells, may be overcome and the infant life, rapidly being choked out, may be saved.

The next class of death-causes which claim attention, in the order in which we have arranged them, is the group of tubercular diseases. Phthisis pulmonalis does not often develop in infancy, and we frequently hear the idea of its occurrence in that period scoffed at by medical men. Other forms of tubercular disease—meningitis, tabes, and hydrocephalus—more commonly attack the infant. There is no apparent reason why the bacillus tuberculosis should not find its way into the system of the young child as easily as it does into that of the adult. Doubtless it does, perhaps remaining in a quiescent state for years and again making its ravages upon meninges or mesentery, where, in infancy, a more favorable nidus for the germ seems to exist and where the presence of tubercle quickly kills.

Happily we are living in an age of wonderful progress in pathology, and we have clearly established, among other things, the contagious quality of these diseases. Heredity, in their causation, is seen to be limited to predisposition or tendency; the actual disease is traced to the entry of the germs through the media of air and meat and milk. We class the tuberculoses among the preventable diseases, and the fact bespeaks hope for infancy as well as for adult life. Fresh air and an abundance of it, the increased capacity of the chest, the disinfection of the products of the disease thrown off by its victims, the inspection of animals and of meat, the application of sufficient heat to all infant foods,—these are the preventive agencies which will eventually lessen the ravages of "the bacillus tuberculosis of Koch."

For the arrest of congenital syphilitic disease and the malformities which are often traceable to it—manifold as it is in its expressions, and far more numerically important than the statistics tell—the profession of medicine can do naught but to educate the people up to a sense of their progenital responsibilities, and to favor those ethical and legal restrictions which will put some check upon the transmission of this social plague.

There remains to discuss the two most important classes of death-causes in infant life—most important alike in the order of their numerical frequency, and in the possibilities of their prevention—the nutritional diseases and the nervous diseases which in infancy are the common sequelæ of gastro-enteric disorders. Let us review the several members of these two groups.

Cholera infantum—a term made to do duty for almost every form of infantile diarrhœaic disease—is in its true character the consequence, in all probability, of a germ which finds a favorable habitat in the disordered alimentary tract of the infant. In the sum total of deaths laid at the door of this complaint are often included, under various statistical tables, gastro-enteritis and its attendant symptom, diarrhœa. In other instances a line is drawn between the two maladies.

The next term—gastro-entero-colitis—is a comprehensive one. As the writer took occasion to show, in the essay already referred to, many authorities upon children's diseases, separate arbitrarily the several conditions grouped under this head, describing diarrhœa, gastro-intestinal catarrh, gastritis, enteritis, and colitis in detail. Such a disseverance of conditions—which are closely related to each other, and differ only in the degree of their intensity and in the particular portion of a practically continuous food-passage which is attacked—is, to say the least, unfortunate. It is confusing alike to the student, the statistician, and the practitioner.

In the same group with these gastro-enteric diseases is included marasmus—a name covering all those death-causes to which this term, or such unscientific phrases as inanition, infantile debility and mal-nutrition, are ordinarily applied. It is intended to be descriptive of conditions which involve any sub-acute or chronic malady of infancy, in which indigestion, alternating constipation and diarrhœa, vomiting and non-absorption or non-assimilation of food are the noticeable symptoms, which variegate the progressively downward course of the suffering infant, who is simply ill-nourished and ill-fed and who finally falls a victim to gastro-enteric disease and its attendant nervous sequelæ, conditions which are related to each other by their most common characteristics, a disturbance of the digestive organs and an invariable impairment of nutrition which results therefrom, and which are unified by the similarity of those errors in hygiene which underlie them all. As such, and so understood, marasmus finds its proper place with other nutritional diseases.

We have said that in the relation of sequelæ to this group of maladies, stand the members of the last class of death-causes. As a matter of course, this is not always the case, but it is very commonly true. Meningitis may appear, even in infancy, as a primary disease, but its occurrence as such is rare. This and the term cerebral congestion are used, somewhat doubtfully as respects their true pathology, to describe those conditions of brain exhaustion which are so commonly the final act in the tragedy of an infant life wasted by cholera infantum, gastro-enteritis, or so called marasmus. Equally true is it that convulsions, invariably the reflex result of some primary disease, is usually a late or sudden consequence of gastric or intestinal irritation. Making allowance for their occasional primary existence or their relationship to other disorders, these nervous maladies, added, in due proportion, to the nutritional diseases we have grouped together, constitute the means of the causation of at least 35 per cent. of the entire fatality of infancy.

One and all, the members of these two classes should be included, to a very great degree, among preventable diseases. They are too truly death-causes, but causes which, in their turn, are the effects of a primary, an ultimate, and an almost universal cause—a neglect of the hygiene of infancy. Perhaps the writer will be pardoned if he lays down, very briefly, the principles of their prevention outlined in his own very recently published words.

This prevention lies in the education of the people up to a simple understanding of those sanitary laws which, almost intuitively, we apply to adult life. For why is it that gastro-enteric disease kills so commonly in infancy and so rarely in later years? that cholera infantum is fatal and that cholera morbus tends to speedy recovery? Why is it that, so soon as the child emerges from infancy and adopts the gastronomic habits of his elders, his tendency to gastro-intestinal disease diminishes and its fatality is practically at an end? It is simply because we have not learned the lesson that the human baby is built upon the same plan as the child of larger growth; because we imagine still that the "mewling and puking" infant of Shakespearian renown is the type of healthy infancy; because we blindly neglect provisions for the well-being of the baby which we count indispensable for the adult and permit abuses in the cradle that would ruin the health of a robust man.

How long would the best of us of mature years withstand the terrors of marasmus if we should be confined in one or two close, stove-warmed, or furnace-heated rooms for an entire winter, without an excuse for ventilation, or a whiff of fresh out-door air; if we were strangers, born and bred, to the taste of pure water, or of any water, in fact, pure or impure; if we were compelled to be perpetually "hungry" in order to get anything to drink; if we revelled in ten or twelve square meals a day, and lunched at pleasure from the breast or bottle through the live-long night; if the food we ate were placed "in the kitchen sink or in the damp cellar to keep cool," prepared in bottles lined with the milk of yesterday, and drawn through rubber tubes especially fitted for the culture of the tyrotoxicon of Vaughn? And yet this is no parody upon the lives of infants in the majority of our families in the humbler walks of life and traces of these infantile habits persist even among the more educated classes. To a child, unprejudiced by a syphilitic or tuberculous heredity, who enjoys pure air, pure water, and pure food,—who has that food suitably prepared, and eats it at reasonable intervals,—to such a child cholera infantum has no fatality, teething has no terrors, diarrhœa is as innocent as it is to an adult and marasmus is a myth.

It devolves upon the medical profession, in the face of this prevailing ignorance, to educate the public in the principles of infant hygiene.

And, first, the choice of infant food is an important and a very difficult task. It goes without saying, that the breast-milk of a healthy mother is the ideal diet of infancy; but it is equally true that the nursing power of our American mothers is not good—that there are, indeed, mothers whose milk not only fails in quantity, but is prejudicial in quality. The pernicious character of a mother's milk is, I am convinced, a common cause of sickness in infancy. As a substitute, I do not favor the wet-nurse. I regard the chances of physical and moral contamination by this means as something more than merely fanciful. The choice, moreover, in Western cities is extremely limited and an infant at the mercy of a capricious nurse for its food-supply may awake at any time to find itself in a deplorably hungry plight.

Cow's milk is, par excellence, the best artificial food, but it demands careful selection and intelligent preparation. In cities a good mixed milk will vary in quality less, within a given time, than will the milk of a single cow. In the matter of milk used for infant food, however, there is greater need of vigilant food-inspection than in the line of any other item of human consumption. The rapid extraction of the animal heat from the milk immediately after milking, and before it is carried far or used, is an essential, particularly in warm weather. Milk intended for infant-food, that has to be kept for twenty-four hours, should be boiled and then placed upon ice.

The casein of cow's milk has been shown to differ from that of human milk in the manner of its curding in the child's stomach. To secure, in the digestion of cow's milk, the preliminary formation of the soft, flaky curds which characterize the mother's milk, it should be carefully blended with oatmeal or barley gruel, gelatine, or other mucilaginous preparations. Many of the infant-foods, whether home-made or the product of manufacture, owe their measure of success less to their intrinsic nutritional value than to this quality which they possess in common with these gruels, though in varying degree, of separating into fine particles the casein curds of the cow's milk with which they are usually combined. Dilution with water will not contribute to this result and involves only the necessity for the separation from the curd, in the child's stomach, of an even larger quantity of water than the milk normally contains.

Of all manufactured articles of infant diet, Carnrick's Foods are the best. They have a larger quantity of proteids than some others; their starchy constituents are mainly converted into the intermediate digestive product of dextrin; and their fats are in a stable form. Those "foods" which approximate the Liebig formula are objectionable, because of the conversion of their starchy elements into the ultimate digestive products of maltose and dextrose, which are liable to fermentation in the child's stomach. Condensed milk is difficult of digestion on account of the large quantity of cane-sugar it contains, and is frequently the cause of gastro-intestinal disturbance. The "Peptogenic Milk Powder" of Fairchild has been found useful in many cases of indigestion; it contributes to the same fine sub-division of the casein curd of the cow's milk, to which we have already referred.

It is hardly necessary to say that the mother's milk digests with much greater rapidity than will any form of artificial food. It follows that infants may be safely fed more often from the natural source of food-supply than with any substitute therefor. The duration of the digestion of any food may vary slightly with different individuals, but the average period may be easily determined.

It is an absolute essential to the present and future health of the infant that its digestive organs shall enjoy a due interval of rest between each meal and its successor. It should be remembered, in this connection, that digestion is not completed when the food leaves the stomach, but has to be carried to its conclusion in the duodenum. Time must be allowed for the completion of the entire act and for a succeeding and sufficient interval of rest, before a second meal is ingested. Moreover, it should be observed that the contents of the stomach increase in acidity progressively during the digestive act, and that to introduce new food into that viscus when it contains old materials, at a maximum degree of acidity, is to prejudice the digestion of the former.

The too frequent feeding of infants is a vice almost universally prevalent and quite generally countenanced or actually encouraged by the profession. It is grounded in custom as hoary, perhaps, and certainly as absurd, as the encasement of the Chinese infant's feet in permanent baby shoes. It is entrenched behind that most dangerous of all arguments—the argument from experience—among the ignorant, while it is condemned by every careful observation of the lower orders of animal life and by every physiologic principle bearing upon infancy. It constitutes a form of over-feeding which is a most pregnant cause of so called marasmus and of all forms of gastro-enteric disease, while it puts the digestive organs of the child into a pathologic state which makes them an excellent nidus for the choleraic germ.

For the past five years the writer has sought to modify this objectionable practice in the feeding of infants, whether in health or in disease, and has been rewarded by the most uniformly happy results in the way of the prevention and cure of diarrhœaic disorders. From a careful study of the duration and progress of the digestive acts in dealing with various food-stuffs, he has concluded that the new-born, breast-fed infant may safely be nursed *not oftener than once in every four hours*, and that the interval should be lengthened as the child increases in age. In artificial feeding, he has found *the best results follow a still lengthier interval*, which may be extended to six hours, omitting after a few weeks or months, as the case may be, one of these four meals.

In all cases of cholera infantum or gastro-enteritis, of any degree of severity, *rest*, upon the same principle, is the *sine qua non* of treatment, and takes the place of much unnecessary medication. When an infant is suffering with any form of stomach or bowel disturbance, it is well to order a period, varying in length according to the gravity of the case, of complete abstinence from food. This period may be wisely occupied in freeing the digestive canal of its irritating contents, which, undigested, act as foreign bodies upon the diseased mucous surface. The sooner the entire alimentary tract is freed from these irritants the better. To lock them up in the bowels by the administration of opiates is the worst possible practice. Rest—complete rest—can only be obtained for the diseased part by the emptying and cleansing of the tract and by the temporary withdrawal of food. Whenever the nervous system is suffering, as it so commonly does, in consequence of gastro-enteric disease, this necessity of rest is doubly emphasized.

It is in the field of these disorders of nutrition that the best and readiest hope lies of diminishing the mortality of infancy. It is by means of these diseases that the cradle is most largely bereft. It is these ills which offer the best chance of prevention and the largest possibilities of cure.

The suggestions these pages offer are not in the nature of panaceas. They are but fragmentary parts—texts, as it were—from that great gospel of infant hygiene, which it is the part of the profession to proclaim to the people, and for want of a knowledge of which these many voices have been heard in Rama, weeping for the children who are not.

XVII.

CLOTHING IN ITS RELATIONS TO HYGIENE.

By JAS. F. HIBBERD, M. D., LL. D., Richmond, Ind.

A number of years' observation as a general medical practitioner has led me to the conclusion that a large percentage of the people who have been the subjects of my observation dress too warmly, thereby perverting the normal functions of the skin, lessening its power of resisting the pathogenic influence of meteorological changes, and not infrequently being the initial link in the chain of morbid processes that lead to serious constitutional disturbances.

If my observations have not led me into error, the matter of the hygiene of dress in civil industrial life in temperate climates is worthy of review by some competent authority, whose investigations shall have the virtue of precision, and whose conclusions shall have the force of demonstrated facts. Most of the exact and reliable consideration of clothing has been made concerning soldiers, sailors, miners, and others who are exposed to severe bodily exercise, in widely varied meteorological conditions; and for these classes the quality, make up, and quantity of clothing for various surroundings have been fairly settled, but the requirements of these classes by no means measure the needs of people pursuing the ordinary vocations of industrious civil life.

Clothing of the civilized peoples of temperate latitudes should fulfil a tripartite rôle, to wit,—(1) It should meet the just demands of modesty; (2) it should satisfy the cultured aesthetic taste in dress adornment; and (3) it should protect against meteorological vicissitudes,—the cold of winter, the heat of summer, and humidity at all times,—snow, rain, and fog in their season.

Of these only the protection of the body against cold in excess comes within the purview of this paper for consideration, not because modesty and adornment in dress have no claims to the attention of the hygienist, but because in this connection their effect is ancillary.

The prevailing idea among the laity, largely shared by physicians, is, that the point to be aimed at in determining upon appropriate clothing is to be certain that it will sufficiently guard against cold without undue hindrance to the motility of the body, little or no attention being bestowed on the possibility of overheating the skin, and still less thought of the evils such overheating may inaugurate.

The nature and importance of our dermal exterior, in its influence on health, are tersely stated by a distinguished member of this Association, who, in writing on hygiene, has this to say of the skin:[1] "It is, therefore, to be regarded not so much as a covering, as an organ having complicated and essential relations to the whole system,—an outspread sheet of membrane, having offices similar to the more concealed sheets of folded vessels packed away under the name of lungs or kidneys, and having in addition a collateral relation to the various and internal physiological processes of life."

In confirmation of this delineation of the great organ through which we have physical contact with the exterior world, we need but reflect that the skin has a very complicated anatomy, is endowed with a rich supply of blood and a most complex distribution of nerves; that its physiological functions are, in addition to its exclusive operations, varied and far-reaching, assisting the lungs by eliminating about one fortieth of the carbonic acid and a portion of effete organic matter, and in like manner aiding the kidneys by secreting about one fourth of the water waste of the system.

It is obvious that such an extensive organ, so richly endowed, and of which such multiple service is required, cannot have its normal functions seriously impeded, perverted, or overtaxed without producing pathological results less or more grave.

It may be laid down as an axiomatic truth, that in personal hygiene the two leading factors are (1) to prevent the ingress of the external causes of disease, and (2) to establish and maintain a resistance to all causes of disease.

Clothing is not largely influential in preventing the ingress of external causes of disease, but is among the more important agencies in increasing or decreasing the resisting power of our physical organizations to the ever present exciters of pathological activity, and it is to this point your attention is invited.

It should be noted in this connection that no allusion is here intended to the cutaneous diseases proper, but only to such systemic disorders as may have their genesis in the skin, through associated or sympathetic relations.

Among the many methods of warding off disease, much more attention is bestowed on measures to prevent the approach or contact of the causes of disease, or to destroy the causes before they have made a deleterious impression, than to establish in the system a resistance to their evil influence; and yet it is so plain as to be almost a self-evident fact, that the safety of a majority of those who escape illness in any community is due to their successful resistance of the causes of illness.

It is a matter of constantly recurring observation, that when a number of persons are exposed in common to a cause of disease, only a fraction of them succumb to its influence; and this is true of ordinary disorders of a locality, and of endemics and epidemics as well, and the escape of the uncontaminated in such cases is due to their ability to resist the morbid impression of the pathogenic agent. Where this resistance is successful against all exciters of pathological activity, it must be accounted an index of perfect health,—the *summum bonum* of all sanitary labors.

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[1] "Principles of Hygiene for the School and the Home," by Ezra M. Hunt, A. M., M. D., Sc. D.

The progress of the world in all that makes for the betterment of man is more rapid and more successful in the temperate than in the torrid zones of the earth, and this largely because of the alternations of heat and cold in the succession of the seasons; and accordingly we logically conclude that these alternations are important factors in establishing and maintaining the health of man, inasmuch as on his sound health depends all his useful progress.

In so far as people succeed in efforts to improperly equalize this difference between the hot and the cold regions of the earth by heating houses and retaining the auto-heat of the body, they mar the benefit that an acceptance of nature's laws would vouchsafe. True, the physician sends his phthisical patient to a warm latitude in winter, but it is not simply to secure greater heat for him, that may be artificially created at home in closed houses and with selected clothing, but the invalid's transportation is ordered that he may find the proper temperature in the open air for such exercise as may best suit his condition, with only modesty's garments for his covering, his skin and his whole body free to the changing atmospheric currents that dilute and disperse his disordered and abundant cutaneous excretions. While this management may best subserve the demands of an invalid, it is quite another thing to provide for the perpetuation of sound health already in possession, or for the restoration of health slightly impaired by inattention to nature's laws or a positive refusal to acknowledge or profit by what the progress of the world has demonstrated to be the value of the alternation of the summer's sun and the winter's frost.

The logic of these facts is, that a periodical exposure to a degree of cold, to be measured by the sensitiveness of each individual for himself, is a valuable aid in the best adjusted evolution of man, physically and intellectually; and it may be laid down as the rule governing the amount and duration of exposure to cold, that the lowest temperature from which the exposed party will speedily and completely recuperate is the best for his highest devolopment.

What is the rationale of hygienic dress in temperate climates for healthy people in the ordinary vocations of civil life? By ordinary vocations is meant the industry of the common laborer, in doors and out,—of the farmer, of the mechanic, of the clerk, of the merchant, of the teacher, and of the professional. There is a general law which will, in a comprehensive way, apply to the regulation of dress for all these classes, and yet each class and many individuals will demand modifications to correspond to the environment, the nature of the labor and exercise, and the idiosyncrasy of the individual.

The qualities of appropriate clothing are chiefly that it should protect from radiant solar heat in summer, without arresting the secreted heat from the body of the wearer or suppressing appropriate ventilation; and in winter, prevent the unnecessary loss of heat from the body by radiation, conduction, or convection, without mischievous impediment to the circulation of the air about the skin, and without cutaneous irritation.

Giving attention to winter clothing, we must bear in mind that it accomplishes our protection against low temperatures solely by preventing the too rapid waste of caloric, the product of our vital activities, and we must realize that the circulation of air under this protecting dress shall be sufficient to dilute and disperse the carbon dioxide and the organic waste secreted by the skin as the correlate of the lungs, and the aqueous fluid normally secreted under the name of insensible perspiration.

If the clothing be such as to retain the carbon dioxide and effete organic matter until fermentation sets in, they become a disturber of the proper functions of the skin and an agent generating disordered conditions direct, or constituting a means of lowering the resisting energy of the system, and thus indirectly offering it a prey to various causes of disease.

If the fabric brought in contact with the surface prove an irritant, its effect is to excite the skin to sensible perspiration, always a depressing agent when excessive, and the irritation may go further and induce inflammation in divers manifestations of cutaneous eruptions. The skin, thus over-excited, has its healthy vigor so weakened that the first current of fresh air that strikes it—and such a current must strike it sooner or later—disturbs the equilibrium of the economy, and, by the law of vital compensations, the sequel may be a catarrh, a rheumatism, a pneumonitis, a hepatitis, a peritonitis, or any other itis in the catalogue as an immediate result, and remotely the party may become the victim of some member of the family of the pathogenic bacteria seeking a congenial soil for its own propagation.

Surely, it does not require further argument to convince that any mismanagement of the skin which excites it to abnormal secretions or an excess of normal secretions, or retains in contact with it excretions that ought to be diluted and dispersed by the circulating atmosphere, is a potent cause of disorder direct, and an equally potent agent in indirectly generating multiple destructive distempers by reducing the resisting vigor of the skin against the external causes of disease.

With this showing, we may proceed on the assumption that all are of one mind, that to seriously disturb the physiology of the skin is to create pathology in it or in other organs of the body.

As already stated, the idea of the people now alluded to concerning dress appears to be, that the one thing to be sought for is certainty that ample warmth be secured without hindrance to the proper motility of the body, with no thought, seemingly, of danger in overheating the body. With the advent of winter they resort to the heavier clothing, placing woollen fabrics in contact with the skin—it may be the coarse, irritating flannel, pressed to the surface by closely fitting over-garments—and thus excite the cutaneous glands to undue activity, causing them to secrete an excess of sebum and an excess of perspiration, which moistens and macerates the confined furfuraceous cuticle that normally falls as a desiccated powder into an unctuous paste, all of which augmented excretions are lodged in the closely fitting garments, rendering them still greater barriers to indispensable ventilation, and intensifying their quality of retaining the auto-heat, and softening and enervating the skin, the whole series of errors and evils aggravated by any exercise that sharpens the respiration and hastens the circulation. This day costume, in a large portion of instances, is changed at night only by substituting bed covering for the outer garments which have been laid off on retiring, the soiled vestments next the skin being made to do uninterrupted service for a week. This management, continued, soon brings the skin into that tender state wherein it has been robbed of its conservative power to resist sudden changes of temperature, that accident or thoughtlessness may bring to the wearer, with the almost certain sequence of catarrhs or other subdermal or internal inflammations and their possible sequels of germ diseases.

The sentiment dictating this line of dress is, that we ought to be shielded from all sense of cold when exposed to a frosty air, even for ever so brief a period. Surely, this is an erroneous sentiment. Without question there is a helpful tonic in the whole surface of our bodies being subjected to a proper recognition of low temperature when present. This is but a modification of the law that renders the inhabitant of a temperate climate capable of greater deeds, physical and intellectual, than his brother whose habitat has no winter, or his other brother who is repressed in body and mind by too much winter.

If we recognize a benefit from the succession of the seasons, we must see the error of constantly guarding ourselves from the direct influence of the low temperatures, because such guarding denies us the benefit of one of nature's rich blessings; and moreover not only thus negatively hinders our betterment, but positively injures, by establishing such lessened resisting vital vigor as to lay us liable to disorder on exposure to low temperatures that we unavoidably encounter through thoughtlessness or accident.

To illustrate the error of dress and its pathological sequels, let us consider a hypothetical case, somewhat overdrawn, to make selected points more conspicuous.

Pater- and materfamilias Blank were converts to the doctrine that no person should be permitted to feel the cold; and accordingly the mother availed herself of every device to shield the children from contact with fresh cold air, swaddling them during the day, and at night encasing them in flannel combination suits, with footlet attachments, that covered them completely from toe to chin, lest in their reflex, restless kicking to escape from over-heating bed-covers a breath of fresh air should reach an unprotected spot of surface. As a matter of fact, children in bed require much less covering than adults, and would probably never, in health, wriggle from under cover while asleep if the cover were not excessive.

Mrs. Blank, in her affectionate unwisdom, forbade her six-year-old son a romp in the yard with his dog in a centigrade zero atmosphere, unless he encased his already well protected feet in overshoes, his hands in mittens, his ears in muffs, and added a top-coat to his superabundant clothing. The romp of the boy, under such surveillance, had the auto-heat and secretions of his cutaneous glands augmented and confined in juxtaposition with his skin, softening its surface and relaxing its resisting vigor, so that next day while his mother was absent shopping, he slipped out, forgetful that he was minus overshoes, mittens, ear muffs, and top-coat, and watched other boys playing hop-scotch on the sidewalk for twenty minutes. Sequel on the morrow—tonsilitis.

This son's older sister, just making her début in society, who had been trained by her parents to mischievous care against cold, and had suffered from catarrhs at almost every accidental exposure in the past, was invited to a birth anniversary party of her young friend, and in evening dress lingered in the unwarmed conservatory with an admirer until quite chilled, followed by a more general and more intense and prolonged catarrh than usual, which broke down the last resisting barrier to the bacillus tuberculosis, which now began its perfect work, and carried the young lady to her premature grave in a twelve-month.

The father was a well developed man of fifty years. An evening alarm, indicating that his store was on fire, started him off without thought of his wraps; and when he found it was a neighboring premises, and not his own, that were burning, he stood admiring the dashing dexterity of the firemen fighting the flames, until a sense of chilliness admonished him of his unwonted exposure; then hastily returned to his home to find himself, the next day, the subject of pneumonia, which proved mortal in a fortnight.

Mrs. Blank herself, whose power of resisting disease had been weakened by excessive clothing long continued, was overcome with grief, and speedily sank into a hopeless invalidism, her increased apprehension of the evil of cool air to her skin confining her to warm rooms, and taxing her ingenuity to provide protection from the imaginary atmospheric currents of her apartments.

It should be remembered that it is not the insufficiently dressed persons who catch cold, but the superabundantly dressed. The inadequately dressed person suffers from morbid conditions growing out of the depressing influence of cold, but it is not catarrh; and as there is rarely, perhaps never, a continued insufficiently clothed person who does not also suffer from lack of nutritious food and other necessaries of health, it is not easy to ascribe to each pathogenic factor its exact share in causing the condition observed.

Every observant person who visits the poverty quarters of a city has witnessed sundry of the inhabitants of divers ages passing along on the cold earth—the writer has seen them on the frozen ground—with bare feet and thin garments, but they do not contract catarrhs, albeit a person accustomed to protected feet and suitable clothing would probably have been seized, from a like exposure, with some mortal distemper.

In further elucidation of this view the following real occurrence is presented: Some years ago three girls, cousins, servants in neighboring families, went out together on an early winter evening to call on a relative. During their stay a squall of rain and snow covered the streets with slush. The girls were without overshoes, and reached their homes with feet thoroughly soaked and chilled. The next evening one of them called at my office with a severe sore throat, and in tears bemoaned her fate, saying that she was continually careful of herself, especially thoughtful to protect her feet, never going on to the damp ground without overshoes, and always guarding them with rubbers while scrubbing. Her cousins, on the contrary, were reckless in their exposure of themselves, tramping over the wet ground and doing their scrubbing with bare feet,—and now all came home in the slush together, and while her cousins did not suffer at all she was nearly choked with an inflamed throat. These cases do not establish a doctrine, but they well illustrate my point, and they suggest a moral touching habit in dress.

In submitting this dissertation there is no pretence of having demonstrated a theorem. I have simply announced an opinion, its true intent being to call attention to what are conceived to be wrong views of clothing in its relations to hygiene, leading to dangerous practices in dress by a large fraction of the population in this latitude. This opinion is not the result of theorizing, but has been pressed upon me by having had to deal with the consequences of errors in this behalf fallen into through mistaken ideas regarding the true rôle of the skin in the human animal economy. It seems time that the relation of clothing to the health of the people of temperate climates engaged in civil industries should be reviewed, and the points for investigation may be summarized thus, viz.:

1. The popular and professional estimate of the hygiene of the skin is much below its real importance.
2. The physiology of the skin cannot be largely interfered with without endangering the general health.
3. One of the most influential factors in the sound health of man is to establish and maintain in his organization a resisting power to the causes of disease.
4. The tendency is to overdress, enervating the skin and curtailing its power, and thereby the power of the whole system to resist the causes of disease.
5. A proper exposure of the surface of the body to environing low temperature is a valuable general tonic.
6. Ventilation of the skin is indispensable to good health.
7. Habit may enable one to bear wide differences in clothing under similar surroundings without detriment, and this should impress the necessity of cultivating correct habits of dress.

MORAL—MIXED.

It is an opprobrium for a politician to turn his coat for a prospective reward of loaves and fishes, but the man who neglects to adapt his vestments to the vicissitudes of the weather fails in his duty to hygeia, and sins in the face of the light and knowledge of sanitary science.

XVIII.

THE OLEOMARGARINE LAW IN THE UNITED STATES.

By EDGAR RICHARDS, Chemist (Microscopist), Office of Internal Revenue, U. S. Treasury Department, Washington, D. C.

In July, 1886, Congress passed an act, which was approved by the President, August 2, imposing a tax on the manufacture, sale, importation, and exportation of oleomargarine, and placing the whole matter under the control of the Commissioner of Internal Revenue. The system followed is very similar to that pursued in collecting the tax on tobacco. The regulations to carry out the law have lately been revised, and went into effect October 1. A brief *résumé* of the law and regulations may not be uninteresting at this time.

Section 8 of this act provides,—

> That upon oleomargarine which shall be manufactured and sold, or removed for consumption or use, there shall be assessed and collected a tax of two cents per pound, to be paid by the manufacturer thereof; and any fractional part of a pound in a package shall be taxed as a pound. The tax levied by this section shall be represented by coupon stamps; and the provisions of existing laws governing the engraving, issue, sale, accountability, effacement, and destruction of stamps relating to tobacco and snuff, as far as applicable, are hereby made to apply to stamps provided for by this section.

Section 3 imposes upon manufacturers and dealers in oleomargarine special taxes, as follows:

> Manufacturers of oleomargarine shall pay six hundred dollars. Every person who manufactures oleomargarine for sale shall be deemed a manufacturer of oleomargarine.
>
> Wholesale dealers in oleomargarine shall pay four hundred and eighty dollars. Every person who sells or offers for sale oleomargarine in the original manufacturer's packages shall be deemed a wholesale dealer in oleomargarine. But any manufacturer of oleomargarine who has given the required bond and paid the required special tax, and who sells only oleomargarine of his own production, at the place of manufacture, in the original packages to which the tax-paid stamps are affixed, shall not be required to pay the special tax of a wholesale dealer in oleomargarine on account of such sales.
>
> Retail dealers in oleomargarine shall pay forty-eight dollars. Every person who sells oleomargarine in less quantities than ten pounds at one time shall be regarded as a retail dealer in oleomargarine.

WHAT IS REQUIRED OF MANUFACTURERS.

Every manufacturer of oleomargarine is compelled by the regulations, in compliance with section 5 of the law, "before commencing business, and on the first day of May of each year before continuing business, to file with the collector of the district in which his factory is located a notice," on a prescribed form, stating the location, the character of the machinery and appliances used for manufacturing, the total capacity, in pounds, for producing oleomargarine each day of twenty-four hours, in his factory; to give "a bond, in an amount to be fixed by the collector, of not less than five thousand dollars, with two or more sureties satisfactory to him;" and to file "an inventory" of "all the materials that enter into the manufacture of oleomargarine, including all materials in process of manufacture, all finished products, and all other materials owned by" him on that date.[1]

He also keeps a book, which is open to the inspection of every internal revenue officer and agent, showing all materials used each day of the month in the manufacture of oleomargarine, and all products, whether of oleomargarine, stearin, or other product; and makes monthly returns from his book on a prescribed form.

This monthly return is made out in duplicate, and duly attested. The original is placed on file in the office of the collector of the district in which the factory is situated, and the duplicate is forwarded to the central office at Washington. This return shows "the quantity and kind of materials used for the production of oleomargarine, and the quantity of oleomargarine produced" each day of the month; and also the quantity and kind of "materials otherwise used during the month." It also gives "in detail the quantity of oleomargarine sold, removed, or destroyed" on each day of the month, with "the serial number of the package, the name, place of business, and residence of the persons to whom sold or consigned;" together with a recapitulation showing the aggregate "quantity on hand at the beginning of the month," the "quantity produced," the "quantity sold and removed," including losses, and the "quantity on hand at the close of the month." These quantities of oleomargarine are stated in *taxable pounds*.

It sometimes happens that tax-paid oleomargarine is returned to the manufacturer. In this case he enters on his book and monthly return "the serial number of the packages and the date when returned." "In case it is worked over," it is credited "on the material account," and if it is sold again intact, "the date of the second withdrawal, and all other particulars, including the name and address of the new purchaser," are entered in red ink on his books and returns.[2]

WHOLESALE DEALERS.

Wholesale dealers are also required to keep a book and make a monthly return, showing in detail "the oleomargarine received" by them "direct from the manufacturers," giving the "date, from whom and whence received, by what manufacturer produced," together with the "serial number of the packages, and the number of taxable pounds;" also "the quantity of oleomargarine disposed of by" them, with the "date, the serial numbers of packages, taxable pounds, by what manufacturer produced," to whom sold or delivered, with name and address;

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[1] See Forms 213, 214, and 215.

[2] See Book Form 61 and Form 216.

also, " the quantity received from other wholesale dealers," the "quantity disposed of to other wholesale dealers," and the " quantity disposed of to persons not known to be wholesale dealers." " Oleomargarine disposed of by a wholesale dealer to himself as a retail dealer or consumer," is included in such statements.[1]

These monthly returns of both manufacturers and wholesale dealers are required "to be rendered to the collector in duplicate on the first day of each month, or within five days thereafter, covering the transactions of the preceding month."

Retail dealers are not required to keep books or make monthly returns.

PACKAGES AND STAMPS.

Oleomargarine is put up in wooden packages, either solid packed, in rolls, or in prints, and before removal from the factory is branded or stencilled on the top with the serial number of the package, corresponding to the number on the stamp, the word " Oleomargarine," and the number of the factory and district. The packages also have a cautionary notice or label pasted on them at the side " in such a way as to be easily read when the package is standing on its bottom." The stamp, which is usually placed near the label or caution notice, "having been affixed," is " immediately cancelled." The face value of the stamp represents the tax on the number of taxable pounds of oleomargarine contained in the package. The stamps are engraved and bound in book form, containing 200 stamps each, of the denominations of 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100 pounds. Attached to each stamp are nine coupons, each coupon representing one pound. " The tax-paid stamp must be signed by the collector and have written thereon the date of the payment of the tax, the number of pounds, the number of factory, the serial number of the package, and the name of the person by whom or for whom it was cancelled."

" Retail dealers in oleomargarine must sell only from original stamped packages, in quantities not exceeding ten pounds, and shall pack the oleomargarine sold by them in suitable wooden or paper packages." (Section 6.) " It is required that each package shall be strong enough to hold the oleomargarine securely, with the exercise of ordinary diligence on the part of the purchaser, until it is delivered at the point of destination." These packages "must have, besides the name and address of the dealer, the word ' Oleomargarine,' and the quantity in pounds contained therein," " written or printed" upon them " in letters not less than one quarter of an inch square," and " so placed as to be plainly visible to the purchaser at the time of delivery to him." " Illegible or concealed marks and brands are not those contemplated and required by the law and regulations."

SAMPLES FOR ANALYSIS.

The law makes provisions for testing substances suspected of being oleomargarine, and also " whether any substance made in imitation or semblance of butter, and intended for human consumption, contains ingredients deleterious to the public health." No samples, however, have ever been submitted under the latter clause.

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[1] See Book Form 61 and Form 217.

IMPORTED OLEOMARGARINE.

Oleomargarine "imported from foreign countries" is not required to have the internal revenue stamps, representing a "tax of fifteen cents per pound," "in addition to any import duty imposed on the same," "affixed thereto and cancelled, unless it is withdrawn from the custom-house for consumption or sale in the United States."

EXPORTED OLEOMARGARINE.

Manufacturers of oleomargarine may export their product, and be allowed credit for the taxable quantity exported, according to law. The regulations give minute details for the different steps to be pursued.[1]

PENALTIES.

Sections 4, 6, 7, 10–13, 15, 17, and 18 of the law impose heavy penalties for violations of its provisions.

LISTS OF PURCHASERS.

From the manufacturers' and wholesale dealers' monthly returns a list is made, at the Washington office, of the names and addresses of the different purchasers in each collection district, which list is sent to the several collectors of internal revenue. By this means a collector can verify his list of wholesale and retail dealers who have paid the special tax, and investigate and ascertain who may be dealers without having paid the special tax required by law.

OLEOMARGARINE IN THE PROHIBITION STATES.

The greatest trouble in enforcing the national law and collecting the special taxes has been met with in those states where the state law contains prohibitory features, which are enforced by arresting and imprisoning all dealers who have paid the internal revenue tax, and whose names appear, therefore, in the collector's book, which is open to public inspection; although beyond that these state officers do not appear to go. These state laws, likewise, prohibit the manufacture or sale of cheese containing foreign fats, and the use of oleomargarine at hotels, restaurants, or boarding-houses,—features of their laws which do not seem to be enforced. The consequence has been that the dealers in these states have abandoned the open sale of oleomargarine, but continue to supply their customers by placing their orders directly with the manufacturers, by whom the oleomargarine is shipped to the consumer's residence, the dealers thus acting as the manufacturers' agents.

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[1] See Regulations, Series 7, No. 9, Revised U. S. Internal Revenue, pp. 19, 37–47.

The consumer of ten or more pounds of oleomargarine has therefore no trouble in obtaining his weekly supply direct from the factory; but the large class of people in these prohibition states, who want only a few pounds at a time, are denied that privilege, and are compelled to pay a great deal higher price for the lowest grades of poor, rancid butter.

STATISTICS.

The following statements, showing the number of manufacturers, wholesale and retail dealers, from Oct. 31, 1886, when the law first went into effect, to April 30, 1889, the end of the last special-tax year, engaged in the business each year; the quantity of oleomargarine produced, withdrawn from factories tax-paid, lost or destroyed. and exported, during the same period; and the receipts during the last two years, are compiled from the reports of the Commissioner of Internal Revenue.

A peculiar but natural tendency, owing to the high rates of the special taxes, has been noted, of dealers paying their special taxes for the last six months of the special-tax year, viz., from November to May, and not for the whole year. In other words, during the spring and summer months, when dairy butter is *cheaper* than oleomargarine, there is no profit in selling the latter. The small manufacturer has been driven out of the business, for the reason that he could not produce enough to make it profitable with his limited plant.

It will be seen from the following table, that, although the number of factories has been reduced from 32, when the law first went into effect, to 23, on April 30 last, the domestic consumption and the exportation of oleomargarine have steadily increased. An average monthly increase of one third of a million pounds in domestic consumption, in the past year, would seem to indicate that notwithstanding the false impressions which were widely disseminated about oleomargarine, it has obtained its permanent place among an increasing class of consumers as a cheap and wholesome article of food.[1]

By the system pursued, each manufacturer's package of oleomargarine can be traced from the time it leaves the factory, duly stamped, branded, and labelled, to the hands of the wholesale dealer, till it reaches the retail dealer and often the consumer. The retail dealers incur such heavy penalties if they do not properly brand their packages with the word "oleomargarine," that its fraudulent sale for butter, *i. e.*, at butter prices, is very limited.

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[1] From a personal inspection, made in the spring of 1888, of many of the stores of the large retail dealers in the Eastern and Western cities visited, I can state that in some of them from one half to one ton of oleomargarine was sold per week, in quantities of less than ten pounds to any one person at one time, put up in packages duly branded as required by the law and regulations. "Cities like Boston with nearly two hundred, and Chicago with four hundred, retail dealers in oleomargarine, give some idea of how extensively artificial butter is dealt in." (See my report to the Commissioner of Internal Revenue, published last year, 1888, p. clxii.)

TABLE I.—STATEMENT SHOWING NUMBER OF MANUFACTURERS AND DEALERS, AND THE QUANTITY OF OLEOMARGARINE PRODUCED IN THE UNITED STATES.

TAX-YEAR.	Manufacturers.	Wholesale dealers.	Retail dealers.	Quantity produced.	Quantity withdrawn, tax paid.	Lost or destroyed.	Quantity exported.	On hand.
Oct. 31, 1886, to April 30, 1887.	32	236	3,929	18,434,177	17,672,507	42,750	525,308	181,090, Nov. 1, 1886. 12,522, Apr. 30, 1887.
May 1, 1887, to April 30, 1888.	29	154	3,279	32,270,532	30,812,624	17,045	1,383,675	57,188, Apr. 30, 1888.
May 1, 1888, to April 30, 1889.	23	160	3,906	37,093,164	34,981,909	2,917	2,065,840	42,498, Apr. 30, 1889.

TABLE II.—STATEMENT OF THE RECEIPTS FROM OLEOMARGARINE DURING THE FISCAL YEARS ENDED JUNE 30, 1888 AND 1889.

OBJECTS OF TAXATION.	Fiscal year 1888.	Fiscal year 1889.	Increase.	Decrease.
Oleomargarine, domestic and imported	$653,355.10	$677,302.40	$23,947.30	. . . . . .
Manufacturers' special tax	17,150.00	12,400.00	. . . . . .	$4,750.00
Retail dealers' special tax	123,258.54	130,631.51	7,372.97	. . . . . .
Wholesale dealers' special tax	70,376.24	73,914.00	3,537.76	. . . . . .
Total	$864,139.88	$894,247.91	$30,108.03	$4,750.00

XIX.

AMERICAN METHODS OF MANUFACTURING OLEOMARGARINE.

By EDGAR RICHARDS, Washington, D. C.

The following description of the methods pursued and the analyses of the ingredients and finished products obtained in American oleomargarine factories, was originally prepared for and published in the "Report of the Commissioner of Internal Revenue for 1888," and is now submitted as supplementary to my paper on the "Oleomargarine Law in the United States."

The following ingredients enter into the manufacture of oleomargarine as pursued in this country: Oleo oil, neutral lard, some liquid vegetable oil, as cotton-seed, sesame, or peanut; butter, in the higher grades, cream and milk, together with salt, and annotto or other coloring matter. A brief statement of the general system pursued in the preparation of the ingredients, and of the finished products, may not be uninteresting. Very few of the oleomargarine manufacturers make their own oleo oil or neutral lard, and none of them refine or crush the vegetable oils used in the lower grades of oleomargarine, but buy them in the open market, these materials being now well established commercial products.

The manufacture of oleo oil is generally carried on in connection with the large slaughter- and packing-houses situated in or near the principal cities, where every effort is made to utilize all portions of the cattle slaughtered. The caul and suet fats are removed from the freshly slaughtered beeves, and placed in tanks filled with water at from 75° to 85° F., where they remain from two to three hours before being transferred to other tanks containing ice-water. By this procedure the fats are gradually deprived of their animal heat, and the danger of their becoming sour is avoided, as would happen if the mass of fat were suddenly chilled by being placed directly in ice-water. The caul, long or slaughter fat, is kept separate from the suet fat, which yields an inferior grade of oil.

A Texan steer will yield on an average 65 pounds of caul and suet fats, from which are obtained 28 pounds (43 per cent.) oleo oil, 21 pounds (32 per cent.) oleo stearin, and 12 pounds (20 per cent.) high grade tallow. The chilled fats, having been thoroughly washed to remove any blood that may be present, are then sent to the rendering tanks. These are generally in a separate building from the slaughter-house. Fat from cattle slaughtered late in the afternoon is generally kept in the ice-water tanks over night before being rendered; thus no fat is more than twelve or fourteen hours on hand, and the great majority less than four hours, before it is rendered. The fat is fed into choppers or hashers revolving at a high rate of speed, from which it issues through fine sieves directly into the rendering tank. This is a large steam-jacketed upright kettle of from 2,000 to 5,000 pounds capacity, provided with revolving blades driven by suitable machinery. Steam being turned on in the jacket, the hashed fat is fed continuously into the tank, and kept in motion by the stirrer. When the tank is full and the contents thoroughly melted, the temperature being from 120° to 155° F., the stirrer is removed, and the water and scrap allowed to settle. The clear fat is drawn off from the top, and run into the graining or seeding cars of from 400 to 600 pounds' capacity, where it is allowed to chill.

The temperature of the room in which these cars are stored is maintained at from 85° to 95° F. The fat in chilling naturally solidifies gradually,—the hardest variety, the stearin, being the first to form a thin crust on top and sides. In from one to three days the whole contents of the car will be in a semi-solid condition. This fat is free from all "greasy" taste. The car containing the semi-solid fat is taken to the press-room, which is maintained at a temperature somewhat below that of the seeding-room, viz., from 70° to 80° F., where it is dipped out by ladle and poured on a stout linen cloth, placed in a suitable depression on a wooden revolving table, and after the cloth is properly folded so as to make a rough bag, it is transferred to the metal plate of a screw-press. A dozen of these cloth bags cover the surface of a plate. When one plate is covered, another one is let down and filled.

When the press is filled, pressure is gradually applied by means of an endless chain revolving a screw: the expressed "oil" constitutes the "oleo oil." This liquid fat is conducted, still hot, from the press into barrels or cars, where it is allowed to cool. The finished product is nearly colorless, tasteless, and at ordinary temperatures is a soft, granular fat, rather than an oil. The hard fat remaining in the filter bags is removed from the press, and forms the beef or oleo stearin, which is used either for making "refined lard" by the addition of cotton-seed oil, or sold to the soap and candle-makers.

The manufacture of "neutral lard" is conducted by essentially the same machinery and at about the same temperature employed in the manufacture of oleo oil. Only the leaf fat of freshly slaughtered hogs is used. A hog yields from 5 to 15 pounds of leaf lard, averaging 9 pounds, 100 pounds of which yield 90 pounds "neutral." The "neutral," however, is not pressed to extract the stearin, but is run directly from the rendering tank into a very strong iced brine, where it remains for about twenty-four hours, when it is removed and placed on shelves to drain. The "neutral" is a white, slightly granular, tasteless, solid fat. The skimmings and scrap from the lard-rendering kettles are strained, and the fat, about two per cent. of the original charge, obtained from them added to the steam-rendered product. Several factories, however, use the ordinary steam and kettle rendered lards, and not "neutral." Great cleanliness is observed throughout both processes, and there is very little manual handling, machinery being used as much as possible, and the fat carefully guarded from any source of contamination.

The by-products of oleo oil and neutral, viz., stearin, tallow, and lard, are standard merchantable articles. Only fresh and sweet fats are used, and tanks, etc., are thoroughly cleaned before use, as a small amount of fat, if allowed to adhere to the apparatus, is liable to decompose in such a way as to spoil the succeeding batch of materials worked up.

Though there may be slight differences in the details, the range of temperature, size of tanks, etc., pursued by the different manufacturers, the general procedure is as above described, the object being to obtain a neutral fat, melting at butter temperatures.

The vegetable oils are prepared by crushing the seeds, etc., and subjecting the crushed mass to hydraulic pressure, or by extracting the oil by carbon bisulphide or other solvent. The crude oil thus obtained is refined to remove the coloring matter by treatment with mineral acids and subsequent neutralization by alkalies, and chilling and pressing, whereby a product is obtained of a light straw-color and bland taste.

The butter used is always selected for its high flavor and taste, and is generally obtained direct from the creamery. Owing to the granular character of oleo oil, it becomes necessary to add some softer and smoother fat; and neutral lard and cotton-seed, or other similar vegetable oil, are added for the purpose of making the mixture more closely approach the consistency of butter. The proportions in which these ingredients are used vary with the seasons of the year, the grade desired, and the formulas of the manufacturers. The charge of milk or cream, however, is the same for all grades manufactured by any particular factory, and varies from 10 to 20 per cent. The milk or cream is allowed to become slightly sour.

The churn used is steam-jacketed, of from 1,200 to 2,500 pounds' capacity, and the whole operation of churning is conducted at a temperature of from 85° to 105° F., insuring the melting and thorough mixture of the solid fats used, thus differing from ordinary creamery practice. The oleo oil and neutral lard are melted in separate kettles at a temperature of about 90° F. The charge of milk or cream is first run in, and the paddles kept in motion until the butter begins to form. Then the charge of melted oleo oil is added and stirred. When this is well incorporated the neutral lard is run in, and finally the annotto, to give the desired butter color. The butter is added either directly into the churn, being first melted, or it is worked into the oleomargarine after it is taken from the churn. The temperature is carefully regulated, being about 85° F. at the beginning, and gradually increasing to 105° F. at the end, when the whole charge has the appearance of a yellowish, creamy fluid. From twenty to ninety minutes are occupied in the churning. The whole melted charge, after it has been sufficiently churned to thoroughly incorporate all the ingredients, is run either directly into tanks containing chopped ice, and constantly stirred, or is met by a stream of ice-water as it issues from the churn. The object is to give the melted mass a fine grain by this sudden cooling. The chilled mass is removed from the tanks, and placed on wooden trays to drain. Here the salt is added, and allowed to work itself in, which generally takes from twelve to twenty-four hours. The salted mass is then thoroughly worked by mechanical rollers, to remove the buttermilk and water, following the general practice of creameries in this and subsequent operations of packing, etc.

Oleomargarine is placed on the market either "solid packed," or in prints or rolls. Four grades are generally made, known as "dairy" and "extra dairy oleomargarine," "creamery" and "extra creamery butterine," the last two containing from 10 to 25 per cent. of the best creamery butter. In the lower grades, from 25 to 60 per cent. of neutral lard, from 20 to 50 per cent. of oleo oil, from 5 to 25 per cent. of vegetable oils, and in some cases from 2 to 10 per cent. of butter, with from 10 to 20 per cent. of milk or cream, are the proportions used. Some factories employ no vegetable oils in their oleomargarine, preferring to use a larger proportion of neutral lard, with a small amount of butter, to obtain the desired butter consistency. In the higher grades the proportions of oleo oil are reduced, the vegetable oils are discarded, and creamery butter is used to make up the charge.

The following tables give the analyses of the different ingredients used by twelve of the largest factories, and the various grades of oleomargarine made in them:

TABLE I.—Analysis of Ingredients and Different Grades of Oleomargarines, received direct from the Factories.

OLEO OIL.

Serial No.	Factory.	Specific gravity at 40° C.	Saponification equivalent.	Vol. $\frac{N}{10}$ NaOH for 2.5 gms.
29	A	.90268	284.6	.000
33	B	.90193	286.4	.000
38	C	.90247	285.3	.000
41	D	.90263	285.6	.000
45	E	.90226	285.8	.000
51	F	.90207	284.9	.000
63	G	.90171	287.0	.096
77	H	.90195	286.8	.207
91	K	.90216	287.9	.158
98	L	.90198	285.0	.148
104	M	.90211	288.0	.000
113	N	.90210	288.4	.000

NEUTRAL LARD.

30	A	.90372	285.9	.000
34	B	.90364	284.6	.000
39	C	.90379	285.1	.000
42	D	.90343	285.5	.000
46	E	.90376	285.9	.000
52	F	.90369	286.0	.000
64	G	.90334	287.7	.000
76	H	.90358	287.5	.208
92	K	.90370	288.2	.000
99	L	.90353	287.1	.000
105	M	.90362	287.4	.000
114	N	.90362	286.9	.000

COTTON-SEED OIL.

31	A	.91118	285.7	.090
43	D	(*)	287.1	.000
53	F	.91130	286.2	.000
97	L	.91082	289.1	.135

SESAME OIL.

32	A	.91034	294.5	.000
35	B	.91173	294.9	.000
47	E	(*)	290.7	.000

BUTTER.

82	A	.90924	250.9	11.234
80	B	.91128	263.5	12.350
84	C	.90985	248.1	12.640
86	D	.90962	253.6	11.980
61	E	.91084	250.3	11.130
48	E	.90963	257.5	11.620
78	E	.91032	255.6	11.198
93	K	.90985	255.7	10.792
106	M	.90978	250.4	12.947

OLEOMARGARINE.

83	A	.90389	286.0	.589
81	B	.90356	286.4	.716
87	D	.90442	285.3	.620
71	F	.90526	287.2	.276
72	F	.90505	287.1	.284
66	G	.90522	286.0	.349
73	H	.90318	287.3	.297
94	K	.90326	284.6	.500
100	L	.90323	284.2	.205
101	L	.90300	287.2	.272
107	M	.90340	286.0	.417
108	M	.90317	287.6	.175
109	M	.90388	284.5	.882
115	N	.90340	285.7	.698
116	N	.90333	285.8	.712
117	N	.90303	286.6	.199

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* Not enough for a determination.

DAIRY BUTTERINE.

79	E	.90350	286.8	1.020
67	G	.90361	286.5	1.160
74	H	.90427	279.4	1.915
95	K	.90375	282.9	1.463
110	M	.90374	283.4	1.158
111	M	.90377	283.9	1.002
112	M	.90418	282.2	1.568
118	N	.90367	283.4	1.224

CREAMERY BUTTERINE.

85	C	.90480	275.8	3.397
49	E	.90508	275.4	2.550
65	G	.90750	266.1	7.577
75	H	.90501	276.1	3.076
96	K	.90416	280.4	1.973
102	L	.90516	277.5	3.476

TABLE II.—EXTREMES IN COMPOSITION OF SAMPLES OF OLEOMARGARINE, AND INGREDIENTS.

OLEOMARGARINE.	Specific gravity at 40° C.	Saponification equivalent.	Vol. $\frac{N}{10}$ NaOH for 2.5 gms.
Oleomargarine:			
Average, 39 samples	.90397	286.0	0.370
Highest	.90526	291.6	0.882
Lowest	.90291	282.3	0.080
Dairy Butterine:			
Average, 9 samples	.90378	284.9	1.293
Highest	.90427	286.8	1.915
Lowest	.90350	282.2	1.002
Creamery butterine:			
Average, 7 samples	.90519	275.9	3.467
Highest	.90750	280.4	7.577
Lowest	.90416	266.1	1.973

INGREDIENTS.

Oleo oil:			
Average, 13 samples	.90216	286.2	.053
Highest	.90268	288.4	.207
Lowest	.90171	284.6	.000
Neutral lard:			
Average, 12 samples	.90362	286.6	.017
Highest	.90379	288.2	.208
Lowest	.90334	284.6	.000
Cotton-seed oil:			
Average, 8 samples	.91198	285.7	.089
Highest	.91403	289.1	.171
Lowest	.91082	283.3	.000

PRODUCTION OF OLEO OIL.

From careful inquiries made by the collectors of internal revenue, last year, in regard to the production of oleo oil in their districts, there was found to be a total of nearly 69,700,000 pounds, of which 12,265,800 pounds were used in the manufacture of oleomargarine, as stated in the manufacturers' returns; 30,146,595 pounds were exported, as shown by the custom-house returns, leaving some 27,210,000 pounds used in the production of some other food product presumably, as the market price of oleo oil is nearly double that of tallow, and thus it would hardly be either produced or bought for lubricating or soap- or candle-making purposes. The following table shows the production:

STATEMENT OF PRODUCTION AND USE OF OLEO OIL DURING YEAR ENDED JUNE 30, 1888.

STATE OR TERRITORY.	District.	Oleo oil produced.	Oleo oil used in oleomargarine.
		Pounds.	*Pounds.*
Colorado			88,634
Connecticut			2,545,172
Illinois	1	37,696,050	5,155,588
Indiana	6		1,801,656
Kansas		790,966	689,537
Maryland		654,479	
Massachusetts	3	1,699,360	324,714
Missouri	6	186,990	
New York	3	17,949,900	
" "	28	686,050	20,795
Ohio	11		49,935
"	18		597,726
Pennsylvania	1	7,670,000	992,043
"	23	2,290,000	
Total		69,623,795	12,265,800
Exported fiscal year ended June 30, 1888			30,146,595
Used otherwise than in the manufacture of oleomargarine.			27,211,400
Total		69,623,795	69,623,795

In deference to the opinion of the Attorney-General of the United States, under date of Oct. 18, 1886, that the qualification of the last clause of section 2 of the oleomargarine law "extends to the whole section, and is an essential element of the statutory definition of oleomargarine," no attempt has been made by the Internal Revenue Bureau to supervise or impose taxes on the manufacture of oleo oil, and so I am unable to state what becomes of this large amount, which is neither exported nor used in the manufacture of oleomargarine.

Section 2 of the act of August 2, 1886, provides "that for the purposes of this act certain manufactured substances, certain extracts, and certain mixtures and compounds," which are enumerated, and include "all substances heretofore known as oleomargarine, oleo, oleomargarine oil," "all mixtures and compounds of" the same substances, "all . . . tallow extracts," and "all mixtures and compounds of tallow, beef fat, suet," "including such mixtures and compounds with butter, shall be known and designated as 'oleomargarine,'" whenever, as the section is construed by the Attorney-General, "made in imitation or semblance of butter, or when so made calculated or intended to be sold as butter or for butter."[1]

From the statements made in their catalogues by manufacturers of centrifugal cream separators, that skim-milk can be enriched by the addition of oleo oil or other similar fat for the production of an artificial cream "for confectionery purposes, or where genuine cream is used," and "by using a superior kind of fat, such as margarine, the milk enriched in this way will also produce very good cheese for early consumption, and emulgated 'Cheddar cheese' has already found a good market in several European countries," some ways of using oleo oil are suggested which must be commercially practised, or else manufacturers would not go to the expense of producing machines for this sole purpose costing $200 and more.

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[1] SEC. 2. That for the purposes of this act certain manufactured substances, certain extracts, and certain mixtures and compounds, including such mixtures and compounds with butter, shall be known and designated as "oleomargarine," namely: All substances heretofore known as oleomargarine, oleo, oleomargarine-oil, butterine, lardine, suine, and neutral; all mixtures and compounds of oleomargarine, oleo, oleomargarine-oil, butterine, lardine, suine, and neutral; all lard extracts and tallow extracts; and all mixtures and compounds of tallow, beef fat, suet, lard, lard oil, vegetable oil, annotto and other coloring matter, intestinal fat, and offal fat made in imitation or semblance of butter, or when so made, calculated or intended to be sold as butter or for butter.

XX.

CERTAIN PROVISIONS OF CONTINENTAL LEGISLATION CONCERNING FOOD ADULTERATION.

By EDGAR RICHARDS, Washington, D. C.

During the past year I have had occasion to look up the subject of the laws and regulations now in force in European countries in reference to the sale of unwholesome or falsified foods, and believe that a brief *résumé* of certain provisions of such legislation may not be uninteresting to the members of this Association.

To attempt to summarize what has been done in each country involves more or less of a review of its police administration, which would make this paper too long. Copies of these foreign laws, decrees, and regulations, and a list of our state laws on the adulteration of food and drugs, dairy products and butter substitutes, will be found in the Reports of the Commissioner of Internal Revenue for 1888 and 1889, to which I would refer those specially interested in this subject.

In examining this mass of legislation, I was impressed with the large scope of the powers of the police authorities in Continental Europe, and that there are many of these functions which our states might adopt with profit. For instance: In addition to what we consider the ordinary police duties relating to the enforcement of the laws and regulations respecting public order, the suppression of crime and violence, the supervision of the excise, of public places of amusements, etc., we find the following as being specified as part of the duties of the police administration in matters relating to public health:

(*a*) The registering and licensing, after previous examination by a board of experts duly appointed for that purpose, of all physicians, surgeons, accoucheurs, midwives, orthopedists, dentists, pedicures, trained nurses, and veterinarians;

(*b*) The registering and licensing, after suitable examination, of all pharmacists and their assistants; also the inspection of all drug-stores, and the enforcement of rigid regulations concerning the sale of poisons;

(*c*) The supervision and inspection of all hospitals, whether public or private, public baths, prisons, schools, slaughter-houses, markets, stores, and other public and private establishments, in regard to their sanitary maintenance;

(*d*) The enforcement of all laws, and the making of all needful regulations to carry out their provisions, in regard to public health, especially those concerning epidemic or contagious diseases of men or animals;

(*e*) The supervision and inspection of all articles which serve as foods, properly speaking, or as beverages, as well as those which are employed in the preparation, production, manufacture, or preservation of such foods, including the places where such articles are sold, stored, or manufactured. (See the laws on sanitary police, of France, Belgium, most of the Cantons of Switzerland, Germany, Italy, etc.);

It is to certain features of the laws and regulations on this last subject that I wish to call your attention. These may conveniently be divided into four heads—general, special, penal, and executive provisions.

GENERAL PROVISIONS.

The word "food" may be said to include all commodities, materials, or ingredients, of whatsoever character, intended for human consumption.

A food is considered as adulterated or falsified,—(*a*) when any substance has been added which does not exist in the normal product, or is only found there in an appreciably lower proportion; (*b*) when any substance has been subtracted that is normally present in the product, and which is not found in the abnormal product or only in an appreciably lower proportion; (*c*) when it is an imitation of, or sold under the name of, another article; and (*d*) when any substance has been substituted, wholly or in part, for the article.

The selling, offering for sale, or otherwise putting on the market, as well as the use, of any food commodity which is unwholesome, altered, or decomposed, is prohibited under severe penalties.

The selling and offering for sale, for the purpose of slaughtering, of animals infected with contagious and other diseases, as well as the selling and offering for sale of the meat from such diseased animals, are prohibited. Power to regulate the proper inspection before and after slaughtering is left to the competent authorities.

The employment of poisonous coloring-matters in the manufacture of clothing, wall-papers, toys, eating, drinking, and cooking utensils, and other articles of common use, as well as their use in wrappers and vessels intended for the packing or for the preservation of food, is also prohibited.

Every dealer in food commodities must be responsible for the quality of his merchandise, whether of foreign or domestic origin.

Every food material must be sold under its true name.

Every dealer having an artificial product imitating a natural product in his possession, whether the same is intended for sale or is claimed to be solely for his own use, must announce such fact by conspicuous placards in his shop. All such artificial products must be duly labelled in a conspicuous and legible manner, bearing the name of the merchandise accompanied by the prefix "artificial."

The manufacture of, trade in, and offering for sale of substances intended for the adulteration of articles for food are forbidden or restricted to certain prescribed methods and substances by stringent regulations of the competent authorities.

The power to regulate and to supervise the methods and the means for carrying out the provisions of these laws is placed with the competent authorities.

SPECIAL PROVISIONS.

These include clear and concise definitions of the different food-products, as well as very often an accurate statement of what shall be the minimum chemical composition of such foods or their ingredients. The latter feature, however, is, owing to the constant advance made in the methods of chemical analysis, and also, it must be said, to the shifting character of adulterants used, much better left to frequently revised regulations by competent authorities than to the precise wording of a law.

1. *Butter and Cheese.*—These must be made from milk or cream, or both, and with or without common salt. Any admixture of a foreign fat not derived solely from milk makes the product artificial, and it must consequently be so labelled and sold. Most of these countries have special laws on the manufacture and trade in artificial butters. (See Reports of the Commissioner of Internal Revenue for 1888 and 1889).

2. *Confectionery.*—This must only be colored with harmless materials, such as (black) chinese black; (blues) Berlin blue, indigo, litmus, Prussian blue, saffron blue, ultramarine; (brown) caramel; (greens) chlorophyl (as spinach-juice), mixtures of yellow colors with blue (a mixture of Prussian blue, Berlin blue, and Persian berries gives a green rivalling in brilliancy Schweinfurt's green); (reds) annotto, Brazil lac, carmine, carmine lac, cochineal, orseil, the juice of beets and red berries (such as cherries, currants, etc.); (yellows) Avignon berries, curcuma, fustel, marigold, Persian berries, quercitron, safflower, saffron, turmeric; chalk and the ochres. The use of substances known to be injurious to health is forbidden in this and other food commodities. Among these injurious substances are included salts of antimony, arsenic, barium, except the sulphate; bismuth, cadmium, chromium, cobalt, copper, iron, the chloride and sulphate, though most iron salts are harmless; lead, magnesium, nickel, zinc, and some of the potassium and sodium salts; oxalic acid, picric acid, cocculus Indicus (Indian berry, levant nut), picrotoxine, gamboge, analine, aloes, eosine, fuchsine, and its immediate derivatives; coloring-matters containing nitrous vapors, as naphthol yellow, victoria yellow; and coloring-matters prepared with di-azo compounds.

Distilled Beverages.—These (such as kirsch, brandy made from grape residue, from lees, or with juniper berries, gentian, etc.) must only bear the name of "natural" when they are produced by the fermentation and subsequent distillation of the fruit or material of which they bear the name, without any addition whatsoever. The sale of these beverages made artificially with alcohol, or increased by alcohol and other substances, is tolerated, provided the mixture contains nothing injurious to health, and is properly labelled.

4. *Flour and Bread.*—The sale of any flour containing ergotized grains is forbidden. The addition of any flour of an inferior value constitutes a fraud if the mixture is not specified. Wheaten flour shall be composed entirely of ground wheat, free from bran, perfectly white or having a faint tinge of yellow; must not show red, gray, or black specks, nor possess a disagreeable odor; must contain no foreign meals, as rye, corn, barley, pease, beans, rice, linseed, buckwheat, and potato starch; no alum to disguise the presence of damaged flour in mixtures, or to improve the appearance of an inferior grade, etc.

5. *Fruits and Vegetables.*—The sale of unripe or of rotten fruits or vegetables is forbidden.

6. *Honey.*—Honey must consist of the saccharine substance collected by the bee (*Apis mellifica*) from the nectaries of flowers, and deposited by them in the cells of the comb. It must not contain any added starch-sugar (glucose), cane-sugar, or inverted sugar.

7. *Lard.*—This must be made exclusively from the rendered fat of the hog, and must not contain any foreign fats.

8. *Liqueurs.*—These must be free from unwholsome materials, toxic bitter substances, fuchsine and other coloring-matters, etc.; and, as they are all artificial products, they must be duly labelled.

9. *Malt Liquors.*—These must consist of the fermented alcoholic infusion of malted barley with water, and flavored with hops. The replacement of these substances by others is considered, if these are inoffensive, as a violation of, and, in case they cause injury to health, as an offence against, the law. They must not contain antiseptics, salt (except that derived from the water used in brewing), or alkaline bi-carbonates. The beer-pumps used must be so fitted as not to produce any alteration in the beverage. The pipes must be as short as possible, and formed of pure block tin. They must be washed out every day with boiling water, and every eighth day with a solution of soda. The air used must be drawn from without, and caused to traverse a bed of pounded and sifted charcoal. The whole apparatus must be kept in a state of perfect cleanliness.

10. *Meat.*—Every animal, before being slaughtered, must be inspected by a competent veterinarian, who will issue the necessary health certificate. An inspection is again made when the carcass is ready to be cut up, and before the removal of the viscera. The inspector will give a permit of sale if he considers the meat sound. Meat is considered injurious which is derived from animals,—(*a*) dying from internal disease; (*b*) poisoned; (*c*) affected by a contagious disease; or (*d*) by a malady involving the decomposition of the blood; also, all meats containing any parasites, as trichinæ, capable of developing in the human body, and all meats entering into putrefaction. The sale of all meat derived from a sick animal is forbidden, whether it may or may not be injurious to health. The slaughtering of calves under sixteen days old, as well as the sale of such veal, is forbidden.

11. *Milk.*—The sale of milk coming from sick cows is prohibited. Persons coming in contact with invalids suffering from contagious diseases should abstain from the handling of milk. The use of vessels of copper, brass, zinc, pottery poorly glazed or made with lead enamel, must be avoided. Places for storing or retailing milk should be clean, airy, and located at a distance from sleeping- or sick-rooms. The use of carbonate of soda, salicylic and boracic acid or their salts, as well as other materials intended as preservative agents of milk, is prohibited. The removal of cream, the addition of water, foreign fats, or coloring matter, are considered as adulterations. Milkmen are required to mark upon their cans in an indelible manner the kind of milk they contain: (*a*) whole (pure) milk; (*b*) mixed or half-skimmed milk, resulting from the mingling of the skimmed milk with the morning's whole milk; and (*c*) skimmed milk, *i. e.*, milk entirely without cream. In the two latter cases milkmen must notify their customers of the character of the product. A specific-gravity test at 15.5° C. (60° F.) of 1.03 is generally recognized as the minimum for pure milk, though chemical analysis is depended upon in cases of dispute.

12. *Spices and Colonial Produce.*—These must be sold in a pure and unmixed condition.

13. *Tinning.*—The tinning of all copper and iron utensils used in the preparation or preservation of foods must be made with pure tin, or one containing not more than one per cent. of lead. Galvanized (*i. e.*, coated with zinc) vessels are not allowed.

14. *Vinegar.*—This must be composed only of acetic acid, and must not contain any other acid, either mineral or organic.

15. *Wine.*—Nearly every wine-producing country in Europe has special laws on this subject, in which a sharp distinction is drawn between natural and artificial wines. A natural wine is defined as the liquid product which results from the alcoholic fermentation of the juice of fresh grapes without any addition whatsoever. Every wine which has not been made solely from the juice of fresh grapes must be sold under the denomination of "artificial wines." Artificial wines may be divided into two classes, viz., imitation and demi-wines, defined as follows: Artificial wines are alcoholic liquids which resemble natural wines, but which are not derived from the fermentation of unaltered grape-juice, and are made with a mixture, such as water, brandy, alcohol, glycerine, sugar, tartaric acid, œnanthic ether, etc., to imitate wines; demi-wines are those resulting from the addition to the must or natural wine of water, sugar, alcohol, and other substances, intended to produce the taste or appearance of wine in such diluted and attenuated liquids, or made in the same manner with grape marc, already used in the preparation of must. Provisions are made for the proper branding and labelling of all vessels and packages containing wine, and for distinctive way-bills, invoices, etc., used in the shipment and the sale of wines. All wines not labelled as artificial are considered as being genuine wines, and severe penalties are imposed for violations of this provision.

PENAL PROVISIONS.

The penalties prescribed range from a small fine, to imprisonment in the house of correction or the penitentiary, with or without hard labor, for a term of years or for life, depending on the gravity of the offence.

In occupations requiring a license from the authorities, said license may be rescinded, and the offender may be deprived of the privilege of carrying on such occupation for a longer or shorter period of time, in the discretion of the court. The repetition of an offence within a year is generally punished by doubling the penalty provided for the first offence.

The selling, offering for sale, or otherwise putting on the market, of a product under a name other than that which its nature requires, although the value of the product may be the same, is considered a fraud, and so punished. Such products may be seized, confiscated, and rendered unfit for use, by the competent authorities.

EXECUTIVE PROVISIONS.

The police administrations are charged with the supervision and the execution of these laws, having power to make and enforce the necessary regulations.

There is generally a state commission of control, composed of three or more experts, appointed with the necessary police powers, to whom this subject is entrusted. They have under their directions the inspectors, veterinarians, and chemists necessary for the proper execution of the laws and regulations. The coöperation of the local police officials, whenever necessary, is obligatory.

The commission meet at least twice a year for the transaction of business. They must also make at least two inspections a year of all factories and warehouses for food.

The inspection and supervision of all establishments intended for the public preparation, manufacture, or sale of foods must be performed by the inspecting officials employed by the commission. The inspections of these establishments must take place at least twice a year, and without previous notification to the owners. Reports of such inspection are made in writing to the commission.

The inspecting officials have the right to enter any establishment within their jurisdiction during the usual business hours or when such places are open to the public, and to take for examination such samples as are necessary.

When the examination of samples cannot take place on the spot, but demands a chemical, microscopical, or similar examination, two samples must be taken and placed under seal by the inspecting official, in the presence of the owners or their representatives, who likewise may affix their own seals thereto. One of these samples is forwarded to the commission with a report, and a request for the proper examination thereof, and the other is retained by the inspecting official. On demand of the owner, another similarly sealed sample may be retained by him.

When there is reason to believe that a food is adulterated or unwholesome, the inspecting official may order it detained until a proper examination can be made.

If the sample proves, on examination, to be adulterated or unwholesome, the cost of said examination is paid by the offender; but otherwise the state pays the cost of the samples taken and of the examination.

All unwholesome foods are to be confiscated and destroyed without compensation to the owner.

Private individuals may have samples of food examined by the experts of the commission by complying with the prescribed regulations and by paying a moderate charge, or free of charge in many countries.

APPENDIX.

LIST OF EUROPEAN LAWS AND REGULATIONS CONSULTED.

AUSTRIA.—HUNGARY.

1. Law of June 21, 1880, on artificial wines.

2. Ministerial decree of September 16, 1880, on artificial wines.

3. Ministerial decree of May 1, 1866, on the use of poisonous coloring materials in articles of common use.

4. Law XIV of the year 1876, on public hygiene. (Hungary.)

BELGIUM.

5. Law of May 19, 1829, on the use of poisonous coloring, and other injurious materials, in articles of food, etc.

6. Law of March 17, 1856, on food adulteration.

7. Penal code June 8, 1867.

FRANCE.

8. Law of March 27, 1851, on food adulteration.

9. Penal code.

10. Military code, June 9, 1857.

10A. Law of August 14, 1889, on wines.

11. For further reference, see,—

(1) The ordinance of October 29, 1846, the decree of July 8, 1850, concerning poisonous substances, and that of the 28th of September, 1882, on the sale of the Indian berry.

(2) The ordinances of the prefecture of police of Paris, under date of 15th of June, 1862, of the 8th of June, 1881, and the 3d of July, 1883, concerning the coloration of articles of food.

(3) The ordinances of the same under date of March 21, 1879, and July 7, 1881, concerning the manufacture of packages for preserved food.

(4) The ordinances of the same of the 1st of February, 1861, and the 18th of July, 1882, concerning the greening of pickles, etc., with copper.

(5) Of the 2d of July, 1878, concerning glazed pottery.

(6) Of April 5, 1884, concerning the coloration of children's toys.

(7) Of April 30, 1881, concerning the preparation of beer.

(8) Of February 23, 1881, concerning the addition of salicylic acid.

(9) Of the 13th of May, 1882, concerning the sale of artificial butter.

(10) Circulars of October 18, 1876, September 1, 1879, and of July 27, 1880, on the coloration of wines.

GERMANY.

12. Law of May 14, 1879, on food adulteration.
13. Decree of May 1, 1882, on the use of poisonous coloring-materials in articles of food, etc.
14. Decree of January 28, 1884, on milk. (Prussia.)
15. Law of May 16, 1868, revised August 23, 1879, on beer. (Bavaria).

ITALY.

16. Law of 1865, on public hygiene.
17. Regulation of September 6, 1874, on public hygiene.
18. Regulation of September 18, 1874, on public hygiene. (Turin.)
19. Proposed law on wine.

PORTUGAL.

20. Law of December 3, 1886, on public hygiene.
21. Regulation of August 22, 1881, on public hygiene. (Lisbon.)

SWEDEN.

22. Law of September 25, 1874, on public hygiene.
23. Law of 1876, on toxic materials.
24. Penal code.
25. Law of August 24, 1842, on public hygiene.
26. Circular of October 30, 1878, of the Department of Justice.
27. Regulation of March 14, 1874, on public hygiene. (Christiania.)

SWITZERLAND.

CANTON OF BERN.

28. Law of May 4, 1879, on inns, beverages.
29. Law of February 26, 1888, on food adulteration.
30. Regulations of August 10, 1889, on poisonous coloring materials.

CANTON OF FRIBOURG.

31. Law of May 28, 1850, on sanitary police.

CANTON OF GENEVA.

32. Regulations of May 1, 1877, on markets.
33. Law of April 7, 1883, on wines.
34. Decree on beer pumps.

CANTON OF NEUCHATEL.

35. Law of May 21, 1885, on wines.
36. Regulations of August 28, 1885, on food adulteration.

CANTON OF VALAIS.

37. Law of November 21, 1882, on food adulteration.
38. Decree of May 16, 1883, on food adulteration.

CANTON OF VAUD.

39. Decree of July 19, 1881, on food adulteration.
40. Decree of May 13, 1886, on honey.
41. Decree of May 2, 1887, on beer pumps.

XXI.

ON THE PREVENTION AND RESTRICTION OF TUBERCULOSIS IN MAN.

By EDWARD PLAYTER, M.D., Ottawa, Ont.

As there are two classes of causes of tuberculosis in man, as of all other diseases,—the remote or predisposing, and the immediate or exciting,—so there are essentially two classes of measures for the prevention and restriction of the malady, both of which must be understood and practised in order to successfully combat it.

While but a few years ago many causes were classed as exciting, I think there is now an almost universal consensus of opinion among authorities that there is but one exciting cause—the bacillus tuberculosis of Koch. In whatever way the bacillus may excite and give rise to the symptoms of the disease, it is at once, practically, the infection and the exciting cause, and it is sufficient for my purpose here to but name it.

It appears to be also universally conceded that this bacillus will not develop into, nor become in the body, an exciting cause at all, unless predisposing causes have already been in operation, and, as it is said, prepared the soil; which, I may note, means that these predisposing causes in some way give rise to breaks in the defences or fortifications of the body,—in the membrane which covers the surface of the cavities within the organism, as well as invests it without,—through which breaks the bacillus is enabled to enter in; or else they so depress the vitality of and weaken the defensive army of cells in the bodily fluids as to render them unable to cope with and destroy the invading bacillus, giving rise, indeed, probably to both these predisposing conditions, as well as to others, such as weakened digestive powers, and more, perhaps, not yet understood.

If, therefore, we are to be successful in preventing and restricting tuberculosis, we must wage war as well against the many unsanitary factors which thus go before and prepare the way by which only the bacillus tuberculosis can find its way into the actual tissues of the body, as well as against the bacillus itself.

As tuberculosis in man, in nearly all cases, especially those of a more preventable character, takes the form of tubercular pulmonary consumption, I shall in this brief paper confine myself to this form of the disease. The predisposing causes of the disease being numerous, in fact being, as we all know, anything which reduces the vitality and vigor of the bodily tissues and functions, I shall not undertake to even name them all now, but the most common and fruitful of them are these three: (1) Malformation of the body, either in its general or more apparent configuration, or in its more histological structures, usually hereditary, the most noticeable defect being imperfectly developed chest and lungs; (2) the rebreathing of breathed air from want of ventilation in dwellings, schools, shops, and other enclosed places; (3) a defective, innutritious diet. Damp soil, exhaustive habits, neglected convalescence from other diseases, &c., are causes I need but mention.

The breathing of impure air from want of ventilation, and the use of a diet insufficiently nutritious to keep up full bodily vigor, are marked predisposing causes which are so universally recognized by the profession that in relation to them physicians habitually advise their patients and the public; but to the imperfectly developed lungs and respiratory capacity, now so commonly observed in civilized countries, I fear altogether too little thought and attention has been heretofore given. With the view of bringing this predisposing cause of this most fatal disease, and the preventable and removable character of this cause, into greater prominence, I propose to make it the special point of my remarks before you to-day.

While probably, on the whole, a good many become victims to consumption who have full respiratory capacity, it is equally probable that nine tenths, at least, of all the victims have not this capacity. There is a very general belief that all consumptives have small lungs, and it appears to me that very few die of the disease who have these organs fully proportioned to the other organs of the body.

Seven or eight years ago I sent out to practising physicians in the United States and Canada copies of a series of questions relative to the causes of consumption. I received replies from physicians in the states of New York, Ohio, Michigan, Indiana, Illinois, Louisiana, and the Dominion of Canada, and obtained a good deal of valuable information relating to the history of about two hundred and fifty cases of the disease. Among other facts bearing upon the subject, such as of the temperament, parentage, locality, occupation, &c., of the patients, the replies showed that in every case the circumference of the chest did not even approximate that of the average of well developed individuals of the same height and weight, as given by authorities in life tables. For example: The average height of all the cases upon which the answers were based was 5 feet 5½ inches. According to the best authorities, the circumference of the chest of a person of this height should be at least thirty-seven inches, or equal to one half plus one fifteenth the height; whereas the average chest circumference of the individuals reported upon was only 31½ inches (about five sixths of that demanded by good natural development), varying in each case from twenty-five to thirty-six inches.

The present condition of society, with so many indoor occupations, limiting, too, the activity of the body, and the consequent sedentary habits of the people, readily accounts for the prevalence of narrow, contracted chests, and the undeveloped or compressed condition of their contents.

Comparatively few people ever habitually use or exercise their lungs to their full natural limit. With lungs not fully developed, and small in proportion to the other bodily organs, it is very easy to comprehend that there would never be that general vigor of the system which respiratory organs of full capacity would confer; while the lungs themselves, including the mucous lining of the air cells, would be in an overtaxed, debilitated, congested condition, which we can, I think, readily understand to be most favorable to the reception and uncontested development, growth, and multiplication of the bacillus tuberculosis.

The practical use, then, of such measures as would remedy and prevent this common defect in the "public chest" would do much to prevent the development of a favorable soil for the growth of this dire disease. Indeed, I believe such preventive measures would do more in a generation or two to reduce the mortality from consumption than any other prophylactic proceedings whatever; besides, they would add immensely to the general vigor and stamina of the people. A larger proportion of applicants than now would then pass in the examinations for West Point, which proportion, according to Mr. Blakie in *Harper's Magazine*, is not at the present time at all satisfactory.

As to the practicability of using means for increasing the chest capacity of children and youths, and even adults, there is no question, and this without special apparatus of any kind. All that is required is to make the practice of inhaling through the nostrils such an abundance of fresh out-door air as shall expand and fill the lungs to their greatest capacity a frequent, universal practice. More running and romping out of doors, for girls as well as boys, would alone help much in this process of lung development, and if generally and frequently practised, would in a few generations remedy this serious evil of small chests. Special practices and positions for expanding the lungs are recommended, and are doubtless most useful, as they receive more attention than do general suggestions or instructions relating to playing, and by tending to beget a general habit they bring about much more rapid results in remedying the defect.

For over twenty years past I have made it my custom to recommend the practice which I shall presently explain, and which, I think, is as good as any other, although neither original nor new. In a great many instances, indeed in hundreds of cases, by means of the practice, I have known the circumference of the chest increased in a few months from two to three inches.

Now, for the prevention and restriction of tubercular consumption in mankind, I would recommend that special, simple instructions be freely distributed among the masses of the people by all health boards and organizations, either as individual boards or associated together, the instructions naming at least the three principal predisposing causes of the disease, as well as the one exciting cause,—the tubercle bacillus,—and explaining how all of them may be avoided, prevented, or removed. Many times during past years I have suggested that boards of health would accomplish much more good by the free distribution of such instructions than by the distribution of those relating to the prevention of much less important, because less destructive, diseases, such as scarlet-fever and diphtheria.

The health department of the city of New York having recently issued and distributed leaflets giving special instructions for the prevention of consumption, this, so far as I know, is the first effort which has been made to do anything special in this behalf, and, I should like to say, I do not see that these instructions could be much improved upon, *so far as they go*. But, inasmuch as they relate to only the one, the immediate, exciting cause of the disease, I would urge the addition of instructions relative to at least the three most important, preventable, predisposing causes, to which I have just alluded, and which I have formulated below and shall presently come to.

Some special systematic means might be adopted in the schools, with great benefit, for the better development of the body, and for instructing the pupils in this and other means of preventing the spread of this disease. Much could be done, and should be done, by forming classes of those pupils requiring chest expansion, and drilling them in the required practices. In the militia, too, something could be accomplished in the same way, especially as a large proportion of the volunteers are young men.

Although much good would doubtless result by giving such instructions in the schools and to the militia, the progress in the prevention of the disease would be slow and small when compared with that which would result from the free distribution of leaflets of instructions among the masses of the people. I would therefore suggest the free distribution in every state and province on this broad continent of the special instructions alluded to, and on a leaflet of good paper, with good, clear, attractive type. I would have millions of these printed, and through the schools and post-offices one at least placed in the hands of every family on the continent. It would not be a very great undertaking. A government department could send them free in sufficient numbers to postmasters, with instructions that one or more be given to every comer. In the cities and larger towns special messengers might leave one copy or more at every dwelling. Sixty or seventy thousands dollars would pay all the costs of paper and printing of twenty millions of copies of such leaflets, or more than one for every family in North America.

On this continent there now die from tuberculous consumption alone every year probably not less than 125,000 human beings. Twenty millions of copies of the instructions so distributed would be the means of saving in a few years the lives of a large number of these yearly victims, besides increasing in an immense but incalculable degree the average stamina of the people of not only this and the next but of many future generations. In no other way could such a sum of money be so profitably spent.

I would therefore suggest the following brief instructions and heading.

All, including those recommended by the New York Health Department, could be printed on one page of a leaflet about eight inches by ten or eleven inches. Thus:

HOW TO PREVENT CONSUMPTION IN YOUR OWN FAMILY AND IN OTHERS.

PASTE THIS ON CARD-BOARD (A PIECE OF PASTEBOARD BOX WILL ANSWER), AND, AFTER HAVING STUDIED IT CAREFULLY, HANG IT UP FOR PRESERVATION AND REFERENCE.

1. Nearly all men, women, and children who die of consumption have the chest and lungs small in proportion to the rest of the body, caused by want of deep breathing, outdoor exercise, and use. Learn to breathe deeply. Increasing the size of the chest of persons disposed to consumption by the following practice will greatly lessen their chances of contracting the disease:

Out of doors in pure air stand straight up, with the thumbs resting on the hips and the fingers forward; then gradually and slowly draw in air, through the nostrils only, until the whole trunk be fully distended, yet without straining; hold in the breath as long as possible without too great effort. and then let it all out very slowly until the whole trunk is compressed as much as possible.

Repeat these acts many times, fewer times at first, more times after practice, and several times a day go through a like practice of taking many such deep breaths. While holding the breath it is best to raise the hands above the head or to throw out the fists directly from the sides.

Whenever exercising in any way, always fill the chest well with air. Keep the lips closed, and breathe through the nostrils only.

Carefully measure the size of the chest around close under the arms when you begin the practice, and observe from month to month how much it increases, thus giving interest in the practice.

Teach the practice to children as soon as they are old enough to learn it. They will make mistakes at first, perhaps breathe in a jerky way, only partly fill the lungs, hold the breath too long or until dizziness alarms, &c., but a little perseverance will overcome all this.

2. The breathing of air once breathed, as in a close room, is a very common predisposing cause of consumption. Never remain long, nor sleep at night, in an unventilated room.

The most practical way to ventilate an ordinary room is to provide an opening between the room and a warmed chimney or stove-pipe flue, by which the foul air is drawn off; the fresh outer air will then in cold weather usually find its way into the room in sufficient quantities.

Never allow a member of your family, if you have one, to live in a room without some such provision. It may require a little extra fuel to warm the fresh air, but this will be repaid many fold in increased health and vigor.

Persons not well nourished take consumption easily. The diet should be plain and abundantly nutritious;—plenty of bread, milk, and fruits for children; for older persons, a moderate allowance of fresh beef, mutton, and poultry; no fancy dishes, pastry, rich cake, confectionery, pickles, sauces, nor the like.

The soil all about the dwelling, and the cellar, should be dry, well underdrained if necessary, and all waste refuse of every sort that will decay or ferment should be burned or removed far away from all dwellings. The water-supply should be of the purest, and all excesses, and everything that depresses or exhausts the body, must be avoided.

Consumption is infectious, and all persons who furnish a suitable soil may "take" the disease, as, for example, in the following ways: By taking as food any substance (such as flesh or milk) containing the living bacilli—the germs of the disease—or by breathing air in which living germs are suspended as dust.

The material which is coughed up, sometimes in large quantities, by persons suffering from consumption, contains the infectious germs often in enormous numbers. This material, when expectorated, frequently lodges in places where it dries, as on the street, floors, carpets, handkerchiefs, etc. After drying, in one way or another it is very apt to become pulverized and float in the air as dust.

By[1] observing the following rules, the danger of taking the disease will be reduced to a minimum:

1. Do not permit persons suspected to have consumption to spit on the floor, or on cloths unless the latter be immediately burned. The spittle of persons suspected to have consumption should be caught in earthen or glass dishes containing the following solution: Corrosive sublimate, 1 part; water, 1,000 parts.
2. Do not sleep in a room occupied by a person suspected of having consumption. The living-rooms of a consumptive patient should have as little furniture as practicable. Hangings should be especially avoided. The use of carpets, rugs, etc., ought always to be avoided.
3. Do not fail to wash thoroughly the eating utensils of a person suspected of having consumption as soon after eating as possible, using boiling water for the purpose.
4. Do not mingle the unwashed clothing of consumptive patients with similar clothing of other persons.
5. Do not fail to catch the bowel discharges of consumptive patients with diarrhœa in a vessel containing corrosive sublimate 1 part, water 1,000 parts.
6. Do not fail to consult the family physician regarding the social relations of persons suffering from suspected consumption.
7. Do not permit mothers suspected of having consumption to nurse their offspring.
8. Household pets (animals or birds) are quite susceptible to tuberculosis; therefore do not expose them to persons afflicted with consumption; also, do not keep, but destroy at once, all household pets suspected of having consumption, otherwise they may give it to human beings.
9. Do not fail to cleanse thoroughly the floors, walls, and ceilings of the living- and sleeping-rooms of persons suffering from consumption at least once in two weeks.

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[1] These rules, and a portion of the above last paragraph, are the same as on the leaflets distributed by the New York Health Department.

XXII.

NOTES ON THE PREVENTION OF PULMONARY CONSUMPTION.

By PAUL H. KRETZSCHMAR, M. D., of Brooklyn, N. Y.,

FELLOW OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION AND OF THE NEW YORK ACADEMY OF MEDICINE, CONSULTING PHYSICIAN TO THE GERMAN LUTHERAN HOSPITAL, ETC., ETC.

Consumption is a disease which depends for its origin upon infection by a micro-organism known as the bacillus tuberculosis of Koch, and while it is true that the most careful researches fail to demonstrate its presence in about ten per cent. of well developed cases of pulmonary consumption, it is conceded by a vast majority of authorities that without bacilli there is no consumption, and that they can be found in every case at some stage or another, and always post-mortem.

United as to the source of infection, observers differ widely regarding the question of direct contagion from a diseased person to a healthy one. Excellent authorities have written upon the side of those who proclaim that the danger of contagion lies in the air exhaled by the patient, and Hermann Weber has gone so far as to speak of cases of direct infection between husband and wife. After a careful study of the subject, the writer has arrived at the conclusion that there are no cases on record which prove that consumption is transmissible from person to person. All instances quoted by those teaching the contrary views can be explained by the results obtained through Dr. Cornet's experiments.

The invasion of the bacilli into the human organism takes place through either the respiratory or the alimentary tract, although cases are known in which the bacilli found their entrance into the system through an abrasion in the integument.

The most frequent channels of infection are the air passages. Considering the large quantities of bacilli which are constantly expectorated by phthisical patients, and the carelessness with which both the medical profession and the laity treat such expectorations, it is fair to presume that ordinary atmosphere, such as we breathe in our large cities, is loaded with bacilli, and that every human being inhales them frequently. Extensive observations have proven that individuals living upon a high physiological plane are comparatively free from danger of infection, and that a certain disposition does exist in most instances which enables the bacilli to invade the human organism successfully. Although it is difficult to give a perfect definition of such disposition, certain changes have been demonstrated to exist in most cases, and we are in a position to-day to predict the development of pulmonary consumption with a considerable degree of accuracy if well defined anatomical and functional derangements exist, and if the subject is exposed to the danger of infection.

Conspicuous among the animals liable to tuberculosis are cattle, and, in a less marked degree, sheep, hogs, chickens, rabbits, etc.

The time allowed for this paper prevents the discussion of the danger of infection from the use of milk or meat derived from tubercular animals: suffice it to say that such danger exists, and that it deserves more attention than it receives at present.

Intelligent supervision of animals which furnish food for the human race is an essential factor in carrying on a successful struggle against the development of pulmonary consumption. No one, however, will contradict the statement that the vast majority of all cases of pulmonary consumption are acquired by people favorably disposed to the development of the disease by inhaling the deadly bacilli. To make any progress in our efforts to prevent the development of pulmonary consumption, we have to concentrate our endeavor in two directions,—first, to destroy or diminish the number of bacilli which float in the atmosphere; and, second, to prevent the development of the disposition of the human organism to acquire consumption. In proportion as we succeed in either direction we shall diminish pulmonary consumption.

If we could devise means to destroy all the bacilli which float in the atmosphere, the most important progress in medical history would be recorded, but there are no indications visible anywhere that would encourage labor in that direction, and our best efforts must be made in the direction of diminishing the quantity of bacilli which surround us. Considering the fact that probably one sixth part of the entire human race suffers from tuberculosis at some time or another, and that every phthisical patient is the source of millions of tubercular bacilli, the difficulty of even this undertaking becomes apparent.

Isolation of all consumptives has been suggested, and will be discussed at the next International Congress for Tuberculosis, to be held in Paris early next year. A number of distinguished members of the medical profession have expressed views favorable to such a plan, but the writer cannot permit this opportunity to pass without placing himself on record as utterly opposed to it. Isolation was practised long before Koch demonstrated the bacillus of tuberculosis.

In[1] Naples and in Portugal laws existed a hundred years ago which placed consumption upon equal footing with pestilence and small-pox. The laws in Naples were of the most stringent character, and existed in the same form for about fifty-five years, without affecting the prevalence of consumption to any marked degree.

If the advocates of isolation would reflect for a short time, and consider the hardship and injury which would follow its introduction, affecting as it would a large proportion of the human race and seriously interfering with our entire social life, without giving the slightest assurance of better results than those obtained after many years of trial in Naples and Portugal, one would think that they would hesitate to advocate so inhuman a proposition. It will not be denied by them that a very large proportion of consumptives are phthisical subjects long before they themselves are aware of it; and even physicians frequently treat "alveolar catarrh" as bronchitis, until the microscope demonstrates the fact that the patient's expectorations are full of tubercular bacilli. What benefit would be derived by isolating advanced cases of pulmonary consumption, if cases during the early stages are permitted to deposit millions of microbes with their expectorations upon our streets, in our churches, public halls, railroads, and all over their own residences? And, finally, what advantage would isolation have if carried out in the state of New York and not in New Jersey or Pennsylvania, or if adopted by the United States and not in Canada?

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[1] Berliner Klinische Wochenschrift, 1883, No. 24.

Isolation is not only cruel, but it is entirely infeasible, and the sooner the medical mind is directed in other channels the better it will be. Even if isolation were practicable, the benefits derived therefrom would not be greater than would be the benefits if the spittoon were to obtain the position in our daily life to which it is entitled, or if proper attention were paid to disinfection of the patient's clothing and wash, the furniture and the floor, and if the carpet were banished from every dwelling inhabited by consumptives.

Of all the experimental researches and investigations made recently regarding the infectious nature of pulmonary consumption, those of Dr. George Cornet,[1] of Berlin, are of the greatest value, and it is only fair to say that through his labors the prophylaxis of pulmonary consumption has advanced to a scientific basis. His teachings should be preached wherever the general welfare of the masses is considered! Dr. Cornet's experiments should be our guide in our efforts to prevent the development of pulmonary consumption, for they demonstrate, first, that the consumptive *per se* is *not*, and, second, that the sputa *are*, the source of danger, not in the moist state, but decidedly so if dried, pulverized, and suspended in the air.

If the air which passes through pulmonary cavities and is afterwards exhaled by the patient is free from bacilli, if the sputa containing them are free from danger as long as they are moist, and if it is positively proven that dried sputa contain the bacilli and are of the most dangerous character, we have laid out for us a well defined plan to prevent the spreading of consumption. It is not necessary to isolate the unfortunate patients, or consider them personally dangerous to their surroundings, but it is of vital importance to destroy the bacilli contained in their expectorations as soon as possible, or to deprive them of the power of doing harm. To obtain this end it is necessary to apply means to keep the expectorations of consumptives (and as we are frequently in doubt when coughing depends upon tubercular invasion, it would be safest to include all those suffering from disease of the lungs) in a moist state. To do this it is necessary that the masses learn to expectorate into spittoons,—not as it is customary now, into handkerchiefs,—and it would be advisable to teach the great importance of this lesson to our children in the schools, and never to cease preaching about it until it becomes the usual habit of people to do so. Where do we find to-day a receptacle for expectorations? Not in our public offices, not in large stores, not in our school-houses, not in railroad cars (except in Pullman palace cars), not in railroad stations, not in any place where large numbers of people assemble, not even in our houses; and yet it is a fact, that without such receptacles—partially filled with appropriate solutions and properly cleaned at frequent intervals—our efforts to prevent the development of consumption are futile.

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[1] Zeitschrift für Hygene v. Bd., p. 192, Squ.

The importance attached to the use of a receptacle for expectoration of even doubtful character by advanced phthiso-therapeutists is demonstrated by the fact that Dr. P. Dettweiler, of Falkenstein, presented a pocket flask before the last German Medical Congress, held in Wiesbaden in April, 1889, which is intended to be used by people who suffer from cough, if spittoons are not handy, and by the adoption of these flasks for use among his patients by Dr. Hermann Brehmer in Goerbersdorf. My friend Dr. P. Dettweiler kindly sent me a sample flask, and I present the same to this meeting for inspection and consideration. There seems to be room for improvement in the construction of the flask, but the theory which is involved in its use is an admirable and sound one, and is the foundation upon which all advance of preventive medicine relating to pulmonary consumption must rest.

Another very important step in the right direction is the prompt and sufficient disinfection of the patient's clothing, bedding, wash, furniture, and of the walls, the ceiling, and the floor of his apartments. It is essential that the soiled linen should not be allowed to accumulate, but it should be washed at frequent intervals and under proper precautions. Properly to clean carpets is so difficult an undertaking that the rooms occupied by consumptives should not be carpeted, linoleum being preferable.

Positive instructions should be given to patients suffering from cough never to swallow their expectorations. Aside from the fact that self-infection,-producing tuberculosis of the intestines, is to be feared, the faeces containing tubercular bacilli would, if they are allowed to become dry (and such is the case in many instances), become the source of great danger.

If we have done our full duty regarding the dangerous expectorations, if the spittoon has been rehabilitated and even made one of the necessisities of life, and we have convinced the popular mind thoroughly that consumption is a preventive disease, and that it is spread broadcast by carelessness principally, we may expect to see the number of deaths from consumption diminish.

The second duty of preventive medicine regarding pulmonary consumption is to diminish the probabilities for the development of the disposition to acquire the disease, and to protect those who present such disposition from the disease itself.

The bacteriologist pure and simple, the man who learned all he knows in the laboratory experimenting upon the lower animals, will dispute the importance of the disposition, and will say, "Before the tubercular bacilli all mankind is equal;" but he who has derived his knowledge from bedside observations and study of the diseased organs will unquestionably admit the danger to which those are exposed who present what Rokitansky so admirably describes as "phthisical habitus," viz., a small heart, situated in a chest of abnormally short anterior posterior diameter, with abnormally long perpendicular dimensions, containing large, voluminous lungs, and a proportionally small abdominal cavity. Of course not every one who carries with him a fertile soil for the development of the tubercular bacilli presents all the morphological and anatomical changes which make the phthisical habitus, nor does every one presenting these peculiarities described by Rokitansky acquire consumption; but to ignore the importance of his statements, or to deny the fact that the existence of the conditions included in the description of the phthisical habitus enables one to predict with a considerable degree of certainty the development of consumption at some future period, would mean that bedside and general clinical experience are of little value regarding the etiology of disease.

For the object under discussion now it is most important to demonstrate, if it can be done, under what circumstances and conditions the disposition referred to is developed,—whether it be possible to lessen the probabilities of producing offspring who carry with them the burden of such a predisposition, and, finally, whether we have means at our command to diminish the danger of acquiring consumption among those thus afflicted.

The question of inheritance has always been considered one of vital interest among those interested in the study of pulmonary consumption. The views now held generally deny the existence of "congenital tuberculosis;" but the disposition to acquire the disease is most commonly found among the offspring of consumptive parents, and about one third of all phthisical patients come from either paternal or maternal parentage suffering from consumption. Sometimes it may be difficult to decide whether the inherited disposition, or the long continued exposure to infection by means of bacilli derived from the dried sputa of the parents, is a greater source of danger to the offspring, but the importance of disposition becomes at once apparent if we follow the admirable and practical teachings of Dr. Hermann Brehmer, of Goerbersdorf, the recognized father of all practical phthiso-therapy, and investigate the patients' family histories extending back to their grandparents.

Without going into any details, the writer makes the statement that with a large experience among many cases of pulmonary consumption, both in private and in hospital practice, he unhesitatingly indorses Dr. Brehmer's views as to the development of a disposition to acquire pulmonary consumption among the offspring of apparently healthy parents:

I. If there are many children in a family, those born after the sixth or after the seventh are apt to develop pulmonary consumption.

II. If several children in a family are born at short intervals, say one year, the younger ones are apt to develop pulmonary consumption.

III. If the offspring of healthy parents, born under conditions named above, escape the disease, their products are apt to develop pulmonary consumption.

These teachings are probably new to most of my hearers (the readers), but the writer has been convinced so thoroughly of their truth and importance regarding the prophylaxis of pulmonary consumption that he invites all members of the medical profession to go to work at once and put them to the practical test of clinical experience.

Patient and diligent inquiries into the family histories of many consumptives induce the writer to make the following strong statement: Only a small proportion of phthisical patients can be found who do not possess a family history which either demonstrates a directly inherited tendency, or a directly (section 1 and 2) or indirectly (section 3) acquired disposition towards the development of the disease.

A most interesting and valuable contribution to this important subject is given in Dr. Brehmer's recent publication,[1] investigating the previous history of those who visited his sanitarium in Goerbersdorf during the year 1888, and the following is a short digest of it: Five hundred and fifty-six patients visited the sanitarium during 1888, 4 patients suffered from other diseases than phthisis, 46 patients failed to give a satisfactory family history; of the remaining 506 cases, as many as 184, or $36\frac{3}{10}$ per cent., were offspring of consumptive parents or grandparents, viz., 65 times from father's side, 76 times from mother's side, 14 times from both parents, 16 times from the father's parents, 12 times from the mother's parents, and twice from the grandparents of both father and mother. These figures demonstrate that in many instances (16 per cent.) phthisis is developed in subjects whose parents were apparently healthy, but were the offspring of phthisical parentage. Of the remaining 322 cases, as many as 109 belonged to families with many children, none of them, however, being higher in the scale than the sixth, and 38 cases belonged to families where the mother had children rapidly, mostly in intervals of one year. This group of "acquired disposition" embraces 147 cases (29 per cent.), only 7 per cent. less than that of "inherited disposition." Of the whole number of 506 cases, 175 remain unaccounted for, but 155 of them have it in common that the patients' parents have been born under conditions described in section 1, but have themselves escaped the development of phthisis to the date of writing; in 77 cases, the indirectly acquired disposition was derived from the father, who was at least the sixth child in 63 instances, and who was born only one year after the preceding child in 17 instances. The mother was the source of acquisition 65 times (respectively 54 and 11 times). Finally, there were 11 cases where both parents belonged to subjects classified in section 1. This leaves 22 cases out of 506, and of those 15 had it in common that either one of the patient's parents or grandparents were suffering from epilepsy, or were insane. Seven cases out of 506 did not present any conditions which would indicate a disposition to the development of pulmonary consumption.

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[1] Mittheilungen aus Dr. Brehmer's Heilaustalt, Wiesbaden, 1889, p. 2. cc.

The writer's own statistical notes do not cover so much material, and he found considerable difficulty in obtaining any reliable information about the patients' grandparents, but, generally speaking, Dr. Brehmer's researches have been verified by the writer's experience.

With such proofs before us, is it not our duty to teach those depending upon us for advice how offspring of healthy families are made to become predisposed to develop consumption, and that marriage of consumptives is to be strongly discouraged.

It is important to know what can be done to protect those with an inherited or acquired unfavorable disposition from becoming victims of the tubercular bacilli, and it is unfortunate that this important subject has been seriously neglected by those otherwise interested in the field of preventive medicine. We know that not all offspring of healthy parents with large families after the sixth child become consumptives, nor do all those born in close intervals with the other children, nor even those of consumptive parents, die of tuberculosis. There are, however, certain functional and structural changes, which, when found existing in young subjects, indicate serious danger of future tubercular infection. In line of their importance these deranged conditions of the human system are,—

1. Those anatomical changes in the formation of the chest which help to present what is known as the phthisical habitus.
2. The fact that the subject is and always has been a small feeder.
3. The fact that, during the age of puberty, the patient has suffered from palpitation of the heart.
4. The fact that, at the same time and frequently for years afterwards, the patient has been suffering from epistaxis (nose bleeding).

If these abnormal conditions, or part of them, are found in subjects whose family histories raise the sign of danger, it is necessary to use such means as will diminish the danger of future infection. Medication is of no value, but a transfer of the threatened subject to a proper climate will do much to prevent the future development of pulmonary consumption. The writer is thoroughly convinced that certain elevated regions enjoy comparative immunity from phthisis, and that a removal of those cases which warrant unfavorable prognosis regarding the development of consumption to such parts, would save many lives. The establishment of a high school for both sexes at Davos Platz is a step in the right direction.[1]

The time allowed for this paper prevents anything like a thorough discussion of this highly interesting subject, but it is to be hoped that these notes will help to arouse the interest of this Association in this vital branch of preventive medicine.

[1] The selection of a calling for such subjects deserves the most careful consideration, and the prospect of living an out-door life should have great weight in deciding the question. Many instances are known to the writer where subjects who presented all the indications for becoming consumptives are in good health, living in certain elevated regions, and pursuing an out-door life.

XXIII.

THE PREVENTION OF PHTHISIS PULMONALIS, AND METHODS FOR ITS LIMITATION.

By EZRA M. HUNT, M. D., Secretary of State Board of Health, N. J.

Those who have read Prof. Elisha Bartlett's "Philosophy of Medical Science" will, we think, admit that he was a medical philosopher, and that the book well deserves to be re-read in the present era of medicine.

It is valuable not only as pointing out the widespread acceptance, in their day, of Brownism, Cullenism, Rushism, etc., but as showing how far medicine is an experimental science in the widest acceptation of the word.

In our fondness for the term science as applied to medical art, and to hygiene in its relations to etiology, we must not forget this. Its laws are far more difficult of ascertainment than those of physics, chemistry, and the like.

It must not only be held strictly to all the details which constitute precision of observation and to oft repeated and check experiments, but before a hypothesis becomes an article of faith there must be such numbers of these as to establish acceptance by the massing of the testimony and the test of experience. There must be great recognition, too, of the difference between an accurate observer and a sound reasoner.

Many a man feels sure as to his fact as a skilled expert, who is entirely in a different sphere when he draws conclusions from his observations or gives opinions which he concieves to be justified thereby. In the one case, he is a skilled manipulator in a particular sphere of observation; in the other, he has entered the field of logical analysis and deduction. He may be a success in the one, and a failure in the other. It is not every accurate observer who can subject himself to the rigid laws of evidence as to conclusions to be derived therefrom, or who knows how much and what kind of observation entitles his opinions to the respect paid to professional, medical experience.

Since there is so much of specialism, and the line is so distinct between the laboratorian and the clinician, there is especial need that in that technology which presents facts for clinical experience we recognize what part of the declaration is technical and what part general and inferential.

In comparison of the methods by which the lawyer and the mental philosopher arrive at deductions and postulate result therefrom, with the methods by which some modern doctrines seem accepted, in medicine and hygiene, we cannot but see strange contrasts. The physicist has learned many of the methods of the former as to the sifting of evidence and conclusions therefrom. He, like ourselves, is a student of etiology. But in our domain it seems to be accepted that mechanical and technical seeing is demonstrative, without the experience of the practitioner, or at least that this is open to greater fallacy: This, notwithstanding the marvellous discrepancies and contradictions in observation among the medical biologists, and the unanimity of observation on certain points and as to certain diseases among practitioners.

We must claim, with Sir James Paget, that the clinician has subjects in his patients to which he applies his own perceptive instruments of precision, and under certain conditions what is seen is as reliable in the one case as in the other.

We are led to these remarks in view of what is the distinctive and prevalent doctrine of our day, as to micro-organisms. As to their relation to some diseases and the importance of these relations there is no disputation.

The chief questions for discussion are such as these: Are micro-organisms or microphytes the cause, and the only cause, of the diseases with which they are associated? If so, what relation to the disease have micro-organisms found to be present, other than the so called specific one? Is it the micro-organism, or its product, that causes the disease?

Are all diseases having an organized virus or micro-organism as their cause *communicable*, or, in other words, do these define the boundary between infective and non-infective diseases? If all such are communicable, are we able to determine to what degree, through what mediums, and to what extent? What are the modes of prevention or restriction applicable to each one of the microphytic diseases?

The gravity of this inquiry is beyond that of any other question of practical medicine. It is fraught with consequences which, if necessary, must be met with bold heroism, but nevertheless, in view of the consequences, both the scientist and the clinician should be positive beyond the chance of mistake before enforcing their conclusions in actual practice. Take, for instance, some of the doctrines as to tuberculosis. It is well said, in a recent able leader in the London *Lancet*, that the "admission of this teaching as proved scientific truth, involves the enforcement of prophylactic measures of the most stringent kind. We talk of the segregation of lepers as the one efficient method for restricting the spread of that scourge of sub-tropical lands, and perhaps we could realize what that implies if we apply the same measure to subdue the ravages of a disease which, in its extent and its fatality, ranks far above leprosy. Yet, to be logical, to the one disease should be meted out the same measure as to the other."

Indeed, in a review of the opinions of these who accept the views of the contagionists, it seems to us that their practical as well as logical conclusion should be that a definite form of separation or isolation should be provided;—all the more because it is evident, from the minute directions given, that the same details of cleansing and disinfection are deemed necessary as in diphtheria, scarlet-fever, etc.

It will not do to offset it, as is done in the New York Board of Health Circular, by conveying the idea that the new view is not so serious because it does away with heredity, or that consumption is not a fatal disease. If one believes all that is embodied in the New York and Paris declarations, the details must be read with a melancholy sadness such as attaches to no announcement of the present century.

It is true, there were protests like that of Dr. Germain Seé, who pronounced false the assumption that the bacillus tuberculosis chiefly causes phthisis by entering the system through the air; as also that meat, unless subjected to a temperature sufficient to kill bacilli (320°F.), and so uneatable, is unsafe; also like that of Dr. Dujardin-Beaumetz, who declared some of the statements "purely hypothetical and unsubstantiated by facts."

Another authority says,—"It is unfortunately too true that scientific men like ordinary mortals, are largely swayed by fashion. And so, advancing beyond what has been demonstrated with proper precision, there are many among us who speak as if micro-organisms were the sole factors in disease and the undoubted cause of all infectious maladies. They would also disregard all clinical experience which is opposed to the prevailing pathological dictum."[1]

We confess ourselves much impressed with such views as are expressed in such sentences as these: "The ways of infection in one and the same disease are manifold and various, and can never be resolved into an exclusive hypothesis."[2]

"Our knowledge of the pathogenic micro-organisms is closely limited to laboratory experiments with pure cultivations of the various species. This is very certainly not the condition of things in that outside world where diseases are contracted and the sick must be treated. There is not much really known of the simple metamorphic processes effected in plain chemical fluids by bacteria; and when it comes to the infinite variations caused by their action on the human body, we can at best only describe results."

"Immunity from the communicable diseases, whether obtained by a previous attack of them, or by the lack of that predisposition of which we hear so much nowadays, is a simple statement of fact, behind which lies an impenetrable mystery."

"Beyond the constant association in a small number of diseases of certain micro-organisms with some of the organs or tissues of the body we have not yet penetrated. It was early seen that the micro-organism, simply as a tenant of the human body, had a comparatively limited influence. The purely mechanical invasion of the tissues of the body should not be more injurious in the case of the pathogenic organism than in that of the innocent growth."

[1] Lancet, August, 1889.

[2] Prof. W. H. Welch.

"It is always to be remembered, that man and the lower animals are affected oftentimes in different ways by one and the same substance or influence."[1]

Those who will examine into the promulgation of doctrine on the special points of the ingestive and inspiratory transmissibility of tuberculosis, will, we think, find that it has been largely based upon the views of Chaveau and Villemen, as expressed by the congress on tuberculosis held in Paris in 1888, and upon the more recent papers of Dr. Georg Cornet.

The authors of these views are of such eminent respectability, that there is need very briefly to refer to them.

So far as the first is concerned it relates almost entirely to the *identity* of the bacillus of bovine and human tuberculosis, and to the communicability of phthisis by means of the meat and milk of tuberculous animals. While the first point is now generally conceded, this is not at all true as to the second. As to the power of the milk to convey tuberculosis there is great lack of that amount and massing and dissecting of evidence and counter-evidence which is necessary to establish such a view.

It rests far more upon the opinion of some veterinarians than it does upon presented evidence. Prof. Crookshank, who has done much to show the identity of the bacillus, regards the communicability through milk as not proven except, perhaps, where the udder is diseased. Here, if conveyed, the milk only conveys it mechanically, much the same as pus might be conveyed by being mingled with the milk just at the point of exit. It was well said, in an able leader in the London *Lancet*, shortly after this congress, that while the hypothesis of communicability might be reasonably entertained, it had not been proven.

As to meat, the evidence is equally inferential, resting on too few experiments, which have not been submitted to the test of collective investigation and analysis, by those not committed to any theory.

We ought to rest with nothing short of the most absolute proof, when milk and meat are so essential and universal articles of food, and when the boiling of all milk and the cooking of all meat to a temperature (320° F.) far beyond an edible degree are involved in such a doctrine.

As we come to the papers of Dr. Georg Cornet, another problem presents itself. While presenting and enforcing previous views as to the bacillus tuberculosis and its *inoculability*, his special contention is, that we are forced to entertain as the only cause of phthisis (except such as is of bovine origin), 1st, direct infection of the lungs through the medium of the air of respiration, and 2d, that the power of infection is confined to the expectoration, furnished in a dried and pulverized condition.

It is at least frank that he in the start presents his hypothesis, even though a close examination of his work, and especially of his positive deductions therefrom, show that quite unconsciously he is influenced by his effort to establish his conception.

(1) To authenticate his view he must entirely ignore the *doctrine of heredity*, and set up a doctrine which will explain its apparent facts.

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[1] H. P. Walcott, M. D.

We are not surprised that Prof. Bollinger, in his report to the Bavarian Home office, while recognizing the need of guarding against pulverized sputa, objects to "Dr. Cornet's view in entirely ignoring the influence of heredity and predisposition as factors in producing or inducing the disease. He (Cornet) goes so far as to stigmatize with the epithet 'unselige' (fatal) the doctrine (practically and theoretically well founded), of an innate and inherited tendency to tuberculosis."

How fully he is followed by the supporters of his views in this country can be seen in the article of Prof. H. M. Briggs—address before the Alumni Association Niagara University, April 9th, 1889—as by various other similar papers from leading writers. If "no special susceptibility is transmitted," then the same is true in insanity, cancer, and in the whole range of inheritance. There is a host of practitioners in this country, who, practising among the more settled populations, have been able to observe for themselves what has happened in three generations, and to trace long family histories, who will not be thus easily convinced. There are multitudes of others, who have specially traced family histories in more changing populations, in hospitals, and in relation to insurance, who will not thus easily consent to the view that heredity is a myth.

There are accumulated stores of facts and experience as to the congenital possession of, or inclination to, tuberculous deposits in various organs, that must be accounted for in order to maintain so exclusive a doctrine.

(2) The author also finds himself under the necessity of showing how the ubiquity of the bacillus tuberculosis, and the great communicability of the disease, are consistent with the fact that so many escape its ravages. He is expressive in his gratitude that the sole cause is the bacillary invasion, and that it is only the invasion of the pulverized bacillus that is so deadly.

This does not accord with the law that obtains in most infective diseases, that the moist contagium is not rendered less effective by its moisture, or with the statement of Prof. McCall, of Glasgow, who believes that cattle become tuberculous chiefly through the ingestion of moist sputa.

However easy it is to see that moist bacilli are not so likely to mingle with the air, the chances, we fear, of minute specks of moist sputa, or of spittle and secretions containing sputa, getting into human systems are much greater than entertained.

But the greater ground for hopefulness and the chief point of many of Dr. Cornet's experiments is to show that the bacilli are confined to the sputa, and are not to be found in breath or in other vehicles. So, if the sputa are well cared for the risk is small. Prof. L. C. Parkes, of London, in his recent book, and Prof. J. Lewis Smith, of New York, do not accept this as proven.

We have failed thus far to find evidence at all reaching toward a demonstration that this distinction can be so accurately drawn.

If every sputum was the result of a cough, in which it merely passed rapidly through the mouth and could always in its separated form be deposited by the invalid in a proper receptacle, we should be more hopeful.

But when it is admitted that the bacilli, during attacks of coughing, "are caught upon the moist surfaces of the respiratory canal, the soft palate, and the teeth,"—when we know that the coating of the tongue, the spittle, the moisture of the lips, must also contain them,—we can scarcely conceive that the expulsive breathing of forced respiration, and the breath forced out by violent cough when no sputum is brought up, do not also contain bacilli in diminished numbers. If so, the breath after drying will also leave its desiccated particles of contagion.

It seems to us important that breath, expired under these circumstances in private houses, in tenement houses, in hospitals, should be collected as it issues from the mouth, and that a series of experiments by different observers, quite different from the collection as made a test by Cornet, should be instituted. We submitted to a learned professor of physics that part of Dr. Cornet's article which discusses its laws as applied to "particles," evaporation, etc. His judgment was that the statement of the physical law was imperfect, and not applicable to the subject to the degree assumed. The laws of gravity have some modification in relation to diffusion of atoms (as those of camphor, etc.), as well as they do as to gases, and many a persistent scent is due to suspended particles only. Prof. Koch seems to us more guarded when he speaks of particles as to a certain extent "atomized." In defending the hypothesis of sole infection by the inhalation of pulverized sputa, it was necessary to establish this distinction, since the experiments of Bollinger, Tappeiner, Grancher, and others show so conclusively that the expired breath of persons suffering with phthisis does not communicate the disease.

Bear in mind, that the question of the sole origin of phthisis from the inspiration of dried sputa, which it is claimed can be safely expectorated and disposed of, is wholly distinct from that as to the inoculability of phthisis by means of the bacillus tuberculosis. That a bite from a dog with hydrophobia causes hydrophobia in the one thus inoculated is no step toward proving that the bacillus of hydrophobia is communicable through the sputum of the dog or his breath. Here are several distinct propositions or hypotheses, one of which may or may not be true without indicating that the other is true, such as,—

I. The bacillus tuberculosis is the cause of tuberculosis.

II. The bacillus tuberculosis is *one* of the causes of tuberculosis.

III. The bacillus tuberculosis is produced *in situ*, and marks one of the stages of tuberculosis. The determining factor is susceptibility.

IV. The bacillus tuberculosis has no other origin than the interior of animals, such as man, birds, and cattle.

V. Phthisis pulmonalis occurs from inoculation with the bacillus tuberculosis.

VI. Phthisis pulmonalis as it occurs, in fact always, results from the inhalation of the bacillus tuberculosis, or from the use of meat and milk containing it.

It is essential that all these propositions, and some others which might be named, be viewed as distinct, and that it be recognized that the proof of the one does not indicate the probability of the other.

Hence in the papers of Dr. Georg Cornet, it is important to separate those parts which seek to establish the sole occurrence of phthisis from expectorated sputa from all other parts. Doing this, we find that on this point the only proof it attempts to offer is,—

I. The comparative effect of *inoculation* in producing peritoneal tuberculosis in sterilized dust and non-sterilized sputum.

II. The fact that out of twenty-one consumptive wards fifteen showed the bacillus, while in wards claimed to have none of the bacilli the sterilized dust had no effect. This is not enough. Indeed, never should such a doctrine be accepted, until thousands of experiments are had, by very many observers of different localities, and until practitioners, too, have given in their testimony. There are too many counter facts to be duly weighed.

A disease which does not at all respond to the usual conditions of contagious diseases, viz., that of protecting or fortifying the individual against future attacks, and that of communicating the disease to a very large proportion of all directly exposed, should not be so readily pronounced virulent and contagious.

The pneumonia produced after a time by a section of the vagi gives rise to micro-organisms "which on being inoculated reproduce the disease in healthy animals," but this does not show it to be contagious to man.[1]

As to Dr. Cornet's article on the death-rate among nurses, on statistical grounds we wholly object to his method, his mode of selection, and his conclusions. It is quite different from the record of the Brompton hospital, in which accurate diagnosis was made and facts were observed with clinical precision at the time of their occurrence. We have never seen a series of plausible but defective tables to which this sentence of Dr. V. T. Bowditch, of Boston, more forcibly applies.

"In all tabulations of results, the word phthisis covers a variety of pulmonary affections, and herein lies one of the chief difficulties of our coming to accurate and definite conclusions."

The selection of the nurses of cloisters, of those who serve for life, and reliance upon the loose records there kept of causes of death, examined years after, is so devoid of statistical reliability, and has in it so many prevalent sources of error, that it cannot be so readily accepted to upset the doctrine of heredity of phthisis, the effects of a sedentary life, etc., and so, in spite of the general testimony of practitioners, be marshalled to prove that these nurses had inhaled bacilli.

In all this discussion there seems to be too little recognition of the perishable nature of most bacilli amid *alternations* of heat and cold, exposure to air, chemical changes, and the activity of other forms of animal and vegetable life. Bacilli cast on the ground and subjected to all outside influences perish, when they do not perish under constant, extreme cold, or the action of disinfectants. There is also such a thing as inhibiting or preventing action when there is not absolute destruction of every spore.

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[1] See Prof. Mays, in *Medical News*, May 25, 1889; also, *Phila. Press*, Feb. 1, 1890.

Is it not time to sound a halt?—not a halt as to the prominence and importance of the facts relating to the presence of micro-organisms in health and in disease, and as to their important connection with physiological and pathological processes;—not a halt in accuracy and frequency of investigation of all the micro-organisms, and in identifying some as the pathological factors in some special diseases;—not a halt in admiration or enthusiasm over such workers in the field of biology as do not authenticate observations until abundantly verified, and then do not arrive at conclusions therefrom which are not inevitable and not warranted by clinical evidence.

But the call for a halt is as follows:

I. Not to declare a micro-organism the *only* cause of a disease because it is always found associated with it, or because the disease can be produced by inoculation with it.

II. Because two or three inocuable diseases are found to have microbes that will reproduce the disease, not to infer that all infective diseases have a specific microbe and are caused thereby;—this, too, in face of the fact that after the most searching effort no characteristic microbe has been found for several of these diseases.

III. Not to infer, because a disease is transmissible through a micro-organism by *inoculation*, that it is also transmissible by *inspiration*.

IV. Not to be absolute in asserting that every microphyte was derived from a germ or spore received from without, of its kind, since the facts of botany, of sports and of evolution, may make it possible that new, low forms of plant life do occur as marking a stage of disease.

V. Not to state so positively the conveyance of tuberculosis by all excreta, by meat, by chickens and birds, and by infection with one's own sputa when near recovery, until more evidence is in and the cross-questions have been put and answered.

VI. Not to speak ex-cathedra so long as there are still some very mooted questions as to the variations in tuberculosis, and as to the histology of some of the pulmonary neoplasms.

VII. Not to assume that what is found true as to propagation or cultivation in rabbits, pigs, etc., is true without limitation or modification as applied to man.

VIII. Not to use the terms "parasitic," "virulent," "contagious," "transmissible," as if indicating a similar degree of communicability, or as involving transmission by inhalation. Let it be remembered that the life-history of a bacillus tuberculosis, exhaled from a diseased lung, and, after drying, inhaled into a *normal*, *healthy lung* and thus causing phthisis pulmonalis, has not yet been written. Until it is, the evidence of its thus being the only *cause* of consumption is incomplete.

We would suggest, without arguing in detail, the following methods for the prevention and restriction of tuberculosis in man:

I. Inasmuch as all sputa are made up of excretions prone to noxious decomposition, and as the sputa of phthisical patients usually have in them the bacillus tuberculosis, they should never be carelessly voided, or allowed to become dry so as to mingle with the air of dwelling-places.

II. Persons who by parentage or close relationship may be regarded as prone to tuberculosis should have special attention given to the development of physical vigor, and both in childhood and in the choice of occupation should prefer an out-of-door life.

III. Early marriage should be discouraged in those who are the children of consumptive parents, and persons who themselves have or have had phthisis should be made fully aware of the risks of parentage.

IV. More attention in general should be given to physical education and to proper alimentation during the period of growth.

V. The proper ventilation of all school-houses, factories, or other buildings in which many persons congregate, should be secured by a system of skilled inspection.

XXIV.

WATER-SUPPLY FOR DRINKING PURPOSES AND WATER-CLOSETS, ON RAILROADS.

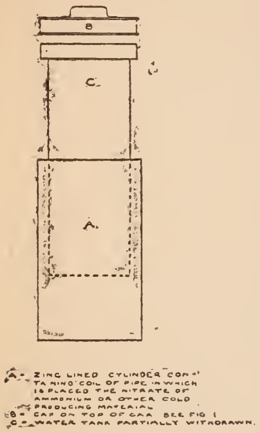
By S. W. LATTA, M. D., Chief Medical Examiner, P. R. R.,
Trenton, N. J.

The matter of railway sanitation is becoming a very important one, and is being agitated by the state boards of health throughout the country.

The problem to be solved is a difficult one. When we consider the great number of railroads and railroad employés; the countless multitudes who travel; the immense difficulties experienced in detecting contagion among these travellers, and the almost utter impossibility of preventing them from moving from place to place,—we get some idea, imperfect though it may be, of the stupendous task before us. There are also to be considered the questions of water-supply to cars and stations for drinking purposes; water-closets in cars and at stations; the ventilation of cars,—questions, the importance of which are rarely appreciated, and the difficulties involved can only be understood by those who have had practical experience in considering them. This Association has wisely concluded to take these matters up and discuss them as separate subjects.

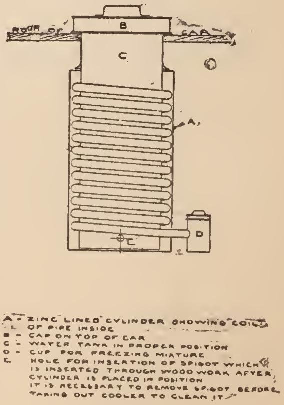
In the construction of a modern railroad car, the desideratum of the builders is to be able to provide seating capacity for as many passengers as possible, with comfort and safety, in the space allotted. At the same time, the American traveller demands water to drink, and the means of relieving nature while *en route*. The spaces available for these purposes are necessarily small. The water-cooler is a long, narrow tube, opening from the top of the car, on the outside of the roof, inaccessible except from that locality, and very difficult to clean. Those intrusted with the duty of supplying the water and ice are men wholly ignorant of the requirements of health, and being usually limited to time, are not as cleanly as they should be. It seems a difficult matter to regulate, so that the water supplied and the ice furnished should meet the requirements of modern sanitation.

To begin at the beginning, the cooler itself should be remodelled. It should be, if you please, a tube within a tube, something like the sketch attached, marked A, No. 1, easy of removal, so that it could be taken out frequently and thoroughly cleaned by scalding. This should be done once daily, where cars are in frequent or nearly constant use. The ice should be taken from a pure source, or, better still, a coil of pipes made to surround the tube, as shown in the exhibit A, No. 2, for the generation of cold, or produced by means similar to the cold storage process. The water supplied to cars should be taken from a pure source and passed through a settling reservoir; or, better, perhaps, through a large filter, similar to the Hyatt. The filter and filter-bed ought to be washed out every twenty-four hours. Water-pipes should lead direct from these reservoirs to the cars. The water being good and the water-coolers in the cars frequently cleansed, there should be little, if any, danger from these sources. The importance, however, of frequent and thorough cleansing of these receptacles cannot be over-estimated, and a systematic system which would meet these requirements ought to be in operation on every railroad. No. 3 shows car in shed with hose arrangements for supplying water to water-cooler.


B
C
A
A - ZINC LINED CYLINDER CONTAINING COIL OF PIPE IN WHICH IS PLACED THE NITRATE OF AMMONIUM OR OTHER COLD PRODUCING MATERIAL
B - CAP ON TOP OF CAR SEE FIG 1
C - WATER TANK PARTIALLY WITHDRAWN.

No. 1.

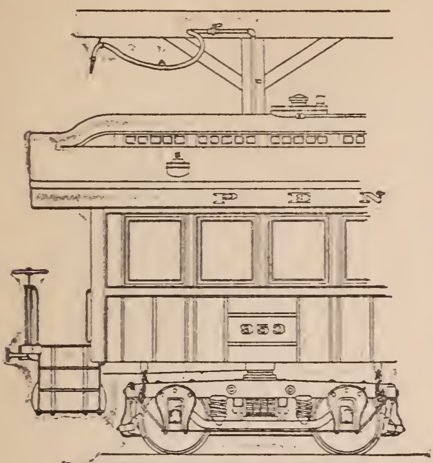
The matter of water-supply for drinking purposes for stations, shops, and large freight warehouses, where many persons congregate, is also not less important. It is estimated that 45,000 persons pass through the Broad Street station of the Pennsylvania Railroad Company, at Philadelphia, daily, and from 28,000 to 35,000 gallons of water is the daily consumption at this station for all purposes. These people spread themselves throughout the length and breadth of the country, and it can readily be seen what a source of infection they would become if the water supplied here contained pathogenic germs. The same thing would obtain where the water supplied to large numbers residing in any locality contained disease-germs, as in towns made up of operatives in railroad-shops.


B
C
A
D
E
A - ZINC LINED CYLINDER SHOWING COILS OF PIPE INSIDE
B - CAP ON TOP OF CAR
C - WATER TANK IN PROPER POSITION
D - CUP FOR FREEZING MIXTURE
E HOLE FOR INSERTION OF SPIGOT WHICH IS INSERTED THROUGH WOOD WORK AFTER CYLINDER IS PLACED IN POSITION
IT IS NECESSARY TO REMOVE SPIGOT BEFORE TAKING OUT COOLER TO CLEAN IT

No. 2.

The most intelligent men of our country are engaged in the management of our railways, and the fact that so little has been done in the way of railway sanitation is simply because these gentlemen are unaware of the value of such a departure, and have not been made to see the monetary gain which would accrue to their several companies by the proper enforcement of sanitary laws.

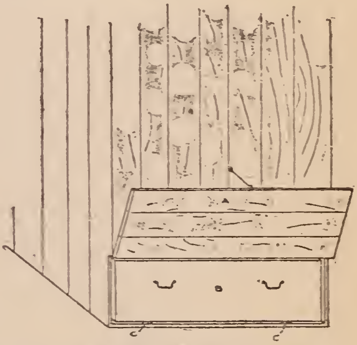
The Pennsylvania Railroad Company appreciated this new feature, and the intelligent general manager of that company, Mr. Chas. E. Pugh, in May, 1885, issued his first sanitary circular. At the same time that company adopted a standard disinfectant, manufactured at its own laboratory, from a formula prepared by the company's chemist, Dr. Charles B. Dudley, a member of this Association. This disinfectant is liberally furnished throughout the entire system, and its use is required in all cars and at all stations. In May, 1889, the general manager issued a second sanitary circular, more comprehensive in its scope and mandatory in its tone. This is widely circulated, and will prove a powerful wedge in the opening up of proper railway sanitary supervision. A copy is hereto attached, and marked A.



THIS SHOWS CAR IN SHED WITH HOSE ARRANGEMENTS FOR SUPPLYING WATER TO WATER COOLER.
A - HOSE
B - CAP OVER WATER COOLER
C - WATER PIPE

No. 3.

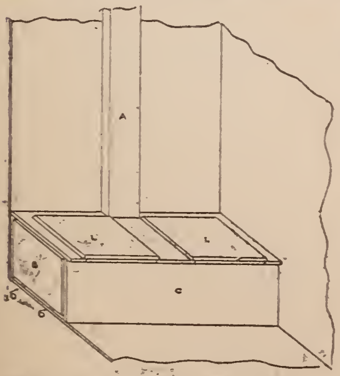
The question of water-closets at stations is a serious one. In towns where there is public water-supply and public drainage, the problem is simple enough. But when we come to consider the small country station, where the station building and out-houses are confined to a small area, we have a more difficult question to meet. Three plans, one of which, it seems to me, might suffice, present themselves.



BACK VIEW OF PRIVY

A - PORTION OF BACK ON HINGES WHICH CAN BE RAISED TO TAKE OUT AND REPLACE BOX - B.
B - BOX CONTAINING EXCREMENT MIXED WITH EARTH
CC - ROLLERS SET IN FLOOR TO ROLL BOX IN AND OUT.

No. 4.



SEAT WITH LIDS CLOSED SHOWING VENTILATOR.

A - VENTILATOR
B - BOX
C - SEAT
LL - COVERS FOR W.C SEATS
DD - ROLLERS

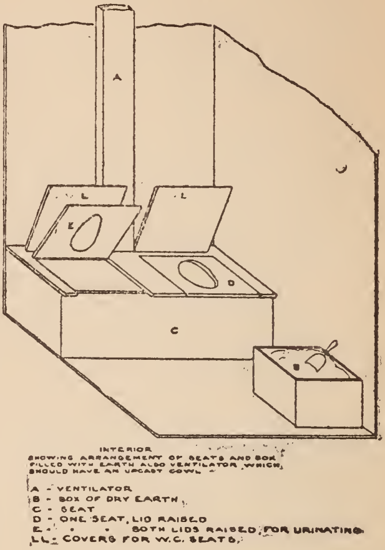
No. 5.

1st. A water-tight receptacle, ventilated through the roof of the privy, having means for attaching the hose of an odorless excavator.

2d. If the means for flushing are at hand, the Waring system of land irrigation.

3d. And as seems to me to be the most feasible plan, is to have the privies built of a standard size; have a standard box to go under the seat from the back, fitting snugly, made of oak, water-tight, with caulked seams. A sketch of such a closet is hereto attached, and marked No. 4, No. 5, and No. 6. Keep a supply of dry sifted ashes, or dry earth, with a small shovel, in a box, in the privy, with printed instructions over the box, to throw some of the contents over the excrement each time any is deposited. Hold the station agent or track foreman responsible for the proper use and supply of the dry earth, and proper disinfection of the boxes, and have a system of sanitary inspections to see that this is done. At stated intervals, have the work train come at night, take away the full boxes, and replace them with clean and disinfected ones. The material contents should be hauled to a designated place and dumped, and they could be disposed of for agricultural purposes, or buried.

Probably the subject hardest to dispose of satisfactorily is the arrangements of water-closets in passenger cars; but I believe the earth-closet would best meet the sanitary requirements. It is certainly a reprehensible practice, from a sanitary standpoint, to have them as now made, where the human excrement is dropped along the road. In many cases this is done in towns as the train passes through, and what is to prevent poisonous germs from being carried by rains into running streams, thus polluting water-courses which may be used for water-supply? In case of a cholera epidemic, this might be especially dangerous.


A
L
L
E
D
C
B
INTERIOR
SHOWING ARRANGEMENT OF SEATS AND BOX FILLED WITH EARTH ALSO VENTILATOR WHICH SHOULD HAVE AN UPCAST COWL
A - VENTILATOR
B - BOX OF DRY EARTH
C - SEAT
D - ONE SEAT, LID RAISED
E - " " BOTH LIDS RAISED, FOR URINATING
LL - COVERS FOR W.C. SEATS.

No. 6.

The enforcement of any system of sanitation demands inspection by sanitary experts; and the announcement of any system of sanitary rules will result negatively, unless there is also included provision for such inspection. These inspectors need to be professional men, well grounded in the theory and practice of sanitary science as now taught, clothed with powers to enforce the necessary sanitary regulations. Such inspections should be made frequently, and systematic reports made of the condition and requirements of the property inspected. With such an inspection service only could the necessities of healthful condition of these vast properties be maintained.

I trust these few remarks, which are offered suggestively only, may bring out a free and full discussion on these most important subjects.

A.

PENNSYLVANIA RAILROAD COMPANY.

CIRCULAR IN REGARD TO DISINFECTION.

The efficiency of the service depending largely on the health of the employés, the attention of all is called to the following points, in regard to disinfection, and general preventive measures against disease.

CLEANLINESS.

One of the most important means of preventing disease is cleanliness, not only of the body, but also of surroundings. No disinfectant or medicine can take its place. The following rules must be observed:

I. All shops, stations, and adjacent grounds, as well as the tracks between stations, must be kept scrupulously clean. Decaying animal or vegetable matter, and rubbish of every kind, must be burned.

II. The floors and seats of privies everywhere must be scrubbed with soap and water not less than once in two weeks, and the vaults emptied whenever the material accumulates to within three feet of the surface of the ground. In no case should a privy vault be less than five feet deep.

III. Drains and sewers must be flushed with fresh water as often as once a week, if the water-supply will admit.

IV. Passenger cars must be thoroughly ventilated, and the plush beaten frequently. The paint and glass must be washed at least once in two weeks.

V. The closets of passenger cars, especially the floor, urinal, and hopper, must be washed at least once a week with "P. R. R. disinfectant," according to the directions given.

VI. Freight cars at stations must be cleaned before leaving the station, and if the refuse from these cars cannot be satisfactorily disposed of otherwise, it must be burned.

WATER-SUPPLY.

Too great care cannot be exercised in keeping the water-supply used for drinking and household purposes free from contamination, impure water being one of the most effective means of spreading disease. The following points should be observed:

I. Privies and stables, and outlets of drains and sewers, are frequently so located that the drainage therefrom finds its way readily into the water-supply. This should never be.

II. As a rule, it is better to take water-supply from rapidly running streams than from any other source, and always some distance above the nearest contamination. Springs, where the high land surrounding them is free from impure drainage, are excellent sources of water-supply. Wells, especially those near dwellings, should be avoided.

III. In all cases where water suspected of contamination must be used for drinking, or as a constituent of food, such water should be boiled, and then allowed to cool and settle before it is used. It is better not to add ice to the boiled water, as ice itself is frequently contaminated. Boiled water may be readily cooled by having it in a metal or earthen vessel, and after wrapping a wet towel around the vessel, placing it in a current of air, or by placing ice in contact with the vessel outside.

IV. Garbage and rubbish of all kinds near the water-supply must be burned or removed.

DISINFECTION.

The best disinfectant known is simply fire. Burn up everything in the shape of filth, and it will never cause further difficulty. In some cases, however, this is impossible, and in such cases disinfectants and antiseptics are properly used, especially (1) to remove offensive odors, (2) render decaying organic matter which cannot be burned less dangerous, and (3) most important, to destroy disease germs. It is believed that the "P. R. R. Disinfectant" will accomplish each of these results. If it is properly used after filth and rubbish of all kinds have been burned or disposed of as directed above, offensive odors everywhere will be reduced to a minimum, and the danger of disease will be very greatly diminished.

I. This disinfectant must be used freely, and all persons in charge of shops, stations, cars, or any portion of the Company property, will be held strictly responsible that the property is as clean and free from odor as possible. P. R. R. Disinfectant is made under the supervision of the Labaratory at Altoona, and may be obtained in boxes holding two dozen bottles by making requisition on Altoona shops. Directions for use accompany each bottle. For use where slight stain is objectionable, a special form of P. R. R. Disinfectant is made which does not stain.

II. For disinfecting clothing, bed linen, or other articles which have become contaminated, and which it is not desirable to burn, the best disinfectant is simply to boil in water for at least half an hour.

III. Sulphate of copper, or blue vitriol, also known as "blue stone," is a very valuable disinfectant. In damp places, in privy vaults, and in cesspools it may be used freely in dry form, being simply coarsely dry powdered and scattered round. In other places it should be dissolved in water before use, not less than one half pound to the gallon of water.

IV. Sulphate of iron or copperas is also valuable, especially as an antiseptic. It is much cheaper than sulphate of copper, and should be applied in the same way and for the same purposes, except that two or three times as much should be used.

V. Ice is very valuable in preventing decomposition, and in this sense is a good antiseptic. It may be used with great advantage on passenger cars, and in the urinals of water-closets at stations. In all cases where the supply will admit, a lump of ice must be kept in the urinal of every passenger car while the car is in service.

INFECTIOUS DISEASES.

If at any time a case of infectious disease is found at a station, in a passenger car, or elsewhere on the Company's property, a physician should be immediately sent for. The car should be removed from the train as soon as practicable, the doors locked, and it should not again be used until it has been fumigated.

The foregoing has been approved by the Pennsylvania State Board of Health, and all employés are expected heartily to coöperate in the above measures for preventing disease, and they are earnestly recommended to apply them also at their own homes.

CHAS. E. PUGH, *General Manager.*

OFFICE OF GENERAL MANAGER,
PHILADELPHIA, MAY 25, 1889.

XXV.

THE ART OF COOKING.

By EDWARD ATKINSON, LL. D., Boston, Mass.

The cost of materials which are used for food comes to one half or more of the average income of at least ninety per cent. of the people of this country; yet our product of food material is more abundant in ratio to population than that of any other country which holds a prominent position in the civilized world. This food consists in greatest measure of grain, meat, dairy products, and roots or tubers; in small part of fish, green vegetables, and fruit. The greater part of this food must be converted into a digestible and appetizing form by the application of heat to it at the right temperature, the degree varying with different kinds of food; this heat must be applied for a suitable time, also varying with the kind of material which is to be converted into a nutritious form by its action. Yet there are no popular treatises or definite instructions on the scientific application of heat to food.

Good health depends in greater measure upon adequate nutrition and upon the conversion of food material into a digestible form than upon any other factor in life. A well nourished man can bear adverse conditions of life in the dwelling-house, the factory, the mine, and the furnace, to which the ill nourished man will succumb in a very short time. On the other hand, the capacity of the man to perform his work is as fully dependent upon the quality and adequacy of his food, as the capacity of the horse, ox, or mule. The force of the man depends on his food as much as the force of the engine upon the fuel used under the boiler. This is almost as true as to mental as it is to physical power.

There are innumerable treatises upon the feeding of animals; upon the generation of steam; upon the construction and ventilation of buildings; upon the arts which relate to clothing the human body, and upon keeping the dwelling and workshop warm; and, lastly, yet more numerous treatises or cookery-books upon the art of mixing and preparing the food which is to be cooked. There are also many treatises, chemical and physiological, upon the subject of nutrition, and there are one or two treatises on the science of cooking, notably Dr. Mattieu Williams's "Chemistry of Cookery;" yet, so far as the writer has been able to ascertain the facts, there is no receipt-book or cookery-book in common use which deals with the actual art of cooking by directing the right application of heat for a suitable time and at a suitable degree, to the specific food which is to be converted into a nutritious form by the conversion of its elements into new forms or conditions by the action of heat upon it.

It is possible that greater attention has been given to this matter in England than in this country. After trying in vain to find an oven thermometer in the United States, I lately imported one from England, made by Joseph Davis & Co., Fitzroy Works, London, S. E., and purchased at an agricultural show at retail for seven shillings sixpence, gauged at from 200° to 600° Fahrenheit. On this thermometer are marked the respective degrees to which various kinds of food should be subjected, as follows:

Pork	320°	Fahr.	Puff pastry	340°	Fahr.
Veal	320	"	Bread	340	"
Beef	310	"	Pastry	320	"
Mutton	300	"	Meat-pie	290	"

These figures agree substantially with my own experiments as to the maximum of heat, but I do not concur with the inference that less than 200° Fahr. may not be permitted, if time be given for the lower degree of heat to do its work. On the contrary, any kinds of very tough meat may be reduced to a very tender condition by the long application of heat at from 180° to 200°, without loss of flavor or nutritious property, provided the food be put into substantially air-tight vessels. The testimony of Dr. Mattieu Williams is conclusive on this point, as well as the special knowledge of the few good cooks of the method of simmering as distinguished from boiling. Meats and grains may be most nutritiously cooked at less than a boiling heat, and eggs should always be; while most kinds of roots, tubers, and vegetables require a higher degree.

I venture now to give some of the general conclusions which I have reached by the application of somewhat crude methods and inventions, on which I have experimented personally in such scraps of time as I could spare from my regular occupation, and on nearly two years' use of my apparatus in my own family.

I will challenge attention and discussion by first submitting some very positive and dogmatic statements, subsequently sustaining them by such proofs as I have to offer:

1. Special apparatus for broiling and frying has been adequately and suitably developed for the use of those who can afford these somewhat wasteful methods of preparing food, yet excellent when skilfully practised.

2. The ordinary methods of frying are utterly bad and wasteful.

3. Bread may be baked suitably in a brick oven, and also economically, when the work is done upon a large scale.

4. It is very difficult to bake bread in a suitable way in the common iron stove or range: for this, among other reasons, most of the bread consumed in this country is very bad, although we have the greatest abundance of the best material.

5. Meats may be well roasted in a costly manner before an open fire.

6. Aside from the exceptional apparatus or methods named, substan-

tially all the modern cooking-stoves and ranges are wasteful and more or less unsuitable for use. All the ordinary methods of *quick* baking, roasting, and boiling are bad; and, finally, almost the whole of the coal or oil used in cooking is wasted.

7. The smell of cooking in the ordinary way gives evidence of waste of flavor as well as a waste of nutritious properties; and in most cases the unpleasant smell also gives evidence that the food is being converted into an unwholesome condition, conducive to indigestion and dyspepsia.

8. Nine tenths of the time devoted to watching the process of cooking is wasted; and the heat and discomfort of the room in which the cooking is done are evidence of worse than waste.

9. The warming of the room or house with the apparatus used for cooking is inconsistent with the best method of cooking, and might be compassed at much less cost if the process of cooking were separated from the process of warming the room or dwelling.

10. No fuel which cannot be wholly consumed is fit to use in the process of cooking, and any chimney which creates a draught upon the fuel when in the process of combustion, like the ordinary chimney of a house, is worse than useless, since it wastes the greater part of the heat generated from the fuel.

The true science of cooking consists in the regulated and controlled application of heat by which flavors are developed and the work of conversion is accomplished. For this purpose a quantity of fuel is required which is almost absurdly small compared to the quantity commonly used.

Compare the ordinary method of using fuel for cooking with the scientific use of fuel for the development of power in the steam-engine.

The sheet of lightly sized linen paper abstracted from the unused part of an old ledger, on which I am now writing the first draught of this essay, measures $13'' \times 9'' = 117$ square inches, and weighs half an ounce. In solid form it measures half a cubic inch. If consumed under the boiler of the modern marine steam-engine, such as is used in the freight steamers that carry our wheat to England, two sheets of this paper in a solid form would be equal to seventy-one per cent. of the calorific value of a cube of bituminous coal of the same size, and would drive a ton of wheat and its proportion of the steamship $1\frac{4}{10}$ miles on the way from the producer to the consumer at the present standard of power developed from coal. Yet not over twelve per cent. of the actual power of the heat which this scrap of paper will yield would even then be actually converted into work. A cube of pure wood-pulp of the same size will do the same work. On the other hand, wood-pulp until ignited is the best available non-conductor of heat: I therefore build my ovens in greater part of wood-pulp, prepared so as not to ignite at any degree of heat which is necessary for cooking: but even in my oven it requires one quart of oil, measuring a fraction under fifty-eight cubic inches, to cook fifty to sixty pounds of bread, meat, and vegetables in four successive charges occupying two hours each. Compared with the application of heat to the development of power, even my oven must be utterly condemned as wasteful of fuel; but compare my quart of oil with the hodfuls of coal that would be required to cook sixty pounds of food in the common range or stove, and then what is the verdict?

I now venture to submit the data of a dinner prepared by myself, but little out of the usual course, as an example of the common practice in my own family, and of what may be done substantially with one lamp. The dinner was provided for my own family of seven persons, with five guests, and it also sufficed for four servants—sixteen in all—with something left over. My summer kitchen is fitted with a cooking-stove, as it is more convenient to use the top of the stove, heated with hard-wood chips, for boiling water, heating the soup, and boiling potatoes, than it is to use a kerosene oil stove of the common kind; on this stove the soup made the day before in the Aladdin cooker was reheated, the potatoes were boiled, and the hot water was provided.

The dinner cooked in the Aladdin oven consisted of three to four pounds of fresh blue fish, just caught, cooked in imitation of broiling, one hour; six to seven pounds leg and loin of lamb, roasted one and three fourths hours; three tame ducks, weighing about seven pounds, roasted one hour; squash cooked in its own juice, with but very little water, one and three fourths hours; stuffed tomatoes cooked three quarters of an hour; a large apple *soufflé* pudding baked one hour.

The oven having been previously heated one hour, the lamb and the squash were first put in; later the fish was added; while these were being served, the ducks and the pudding were being cooked; the use of the lamp for the whole service was four hours; the oil consumed, one pint, cost less than two cents; the cook's estimate of the coal which would have been required for the dinner had it been cooked in the large stove which has been used in other years, at one and a half to two ordinary hodfuls.

This was an every-day dinner, to which my guests had been invited in order that they might test our common practice.

I assume that the effect of heat upon food material is what may be called chemical conversion, accompanied, when the heat is applied at a low degree only, by partial evaporation of water, but when applied at a high degree, by partial distillation of the juices, by the cracking or dissociation of the fats, and by the diffusion of the volatile parts of the food in bad smells, with loss of flavor and waste of some of the nutritious properties of the material. If the cracking or dissociation of the fats is carried to a point which is very common in iron stoves and ranges, the residuum of the fat becomes very indigestible and positively unwholesome. When rightly cooked and not cracked or dissociated, a certain portion of fat is absolutely necessary to adequate nutrition. Is it not true that we take into our stomachs a great deal too much fat, and that it is eaten in the most injurious form?

The preparation of the coffee-berry is the most familiar example of the development of its properties by the right application of heat. If the berry is dried, ground, and made into an infusion without being roasted, no true or drinkable coffee can be made from it. If overheated and burned, the infusion is acrid and unwholesome. But when the berry is carefully roasted and ground, the infusion makes true coffee. The flavor and other properties are the actual product of the heat, when scientifically applied. The flavor of the pea-nut is developed in the same way. In the treatment of grain, none yields so great a difference in flavor, according to the method of cooking, as the meal of maize or Indian corn; but I find the wheaten bread, whether made of whole or of bolted flour, yields a much finer flavor when baked two or three hours in my pulp oven at 250° to 300° Fahr., than when quickly baked in a common stove or range in one hour at an unknown but admittedly much higher degree of heat. The flavors of the white kinds of fish, such as cod, haddock, flounder, scup, and the like, which are much impaired by the ordinary methods of cooking, are very finely developed when slowly cooked in my oven; and, lastly, all kinds of meat and poultry develop their respective flavors in the most appetizing manner when roasted in my pulp oven at such low degrees of heat as not to give off any smell, or to dissociate any of the volatile elements of the juices or fats, while for game nothing can equal it. Quail and partridge come out rich, juicy, and of almost too full a flavor.

I have frequently served dinners or lunches of four or five courses—soup made the day before reheated, fish, meat, game, potatoes, cauliflower, asparagus, onions, tomatoes, and custard pudding—all cooked in the same oven at the same time in the dining-room, and served from the oven to the table in the china or earthen dishes in which each had been cooked; the only difference between one dish and another being in respect to the time in which it had been subjected to the heat of the lamp or lamps, yet without the least flavor or taint being carried from one kind of food to the other.

It will be apparent that, if cooking can be done in this way, the whole art will consist in preparing the food according to written or printed receipts, and in determining the degree of heat and the time to which these dishes should be subjected. No watching is needed, and indeed none is possible without danger of cooling off the oven by opening it too often. Of course, it is better to use two ovens than one, devoting one to meat and fish, served by a lamp of moderate power for the right period of time, and the other served by a lamp of higher power for cooking vegetables, puddings, and pastry.

My Aladdin ovens, so called, are adapted to methods of cooking corresponding to broiling, roasting, baking, and braising; but they can also be used for boiling and simmering.

My Aladdin cooker, so called, in which the heat is conveyed through water, is devoted wholly to boiling, stewing, and simmering, especially the latter. I neither attempt nor desire to *fry* anything in either kind of apparatus. About nine tenths of all the cooking of my somewhat large family has been done with this apparatus for nearly two years, and I also have an office lunch-room for the use of about twenty employés, in which no other apparatus is or can be used. My summer kitchen at my sea-side house is fitted with a grill which is very seldom used: it proves to be most convenient to use the cooking-stove, heated with hard-wood chips, for boiling the water for tea and for occasional frying.

My winter kitchen is a large one, and it depends upon the range for warming it. The range, therefore, continues to be used to some extent for cooking, mainly for preparing breakfast, but I contemplate substituting a special stove without any oven, which will heat the room with much less coal, the top of the stove being fitted for cooking in the ordinary way. Neither the oven of the stove in summer nor of the range in winter is now used for cooking; therefore, the kitchen is never overheated and the food is never spoiled. We have occasionally failed to cook a large joint of meat for a sufficient time, but we have never spoiled a dish in the process of cooking since the pulp or jacketed oven was adopted.

What, then, are the simple principles of the science of cooking? I think they may be stated in a few very plain terms:

1. The heat should be derived from fuel which can be wholly consumed or wholly converted into the products of complete combustion without any chimney except that of a lamp or burner. The fault with coal, especially anthracite, is, that it is not evenly or fully consumed; hence the need of a chimney to take away the gases developed and not wholly consumed; but the chimney also carries off the greater part of the heat. It is very evident that the crude combustion of coal and the direct application of the heat generated will ere long give way to more scientific methods of consuming the gaseous products and of deriving the heat from the final combustion of the gaseous products in all arts. In the matter of cooking, kerosene oil burned in any one of the types of lamp which have a central duct to convey oxygen from below to the inner side of a circular wick, when properly trimmed and served with well distilled oil, gives substantially perfect combustion.

The same may be said of illuminating gas when used in one of the burners of the Bunsen type, which supply an excess of oxygen and yield the blue flame.

The combustion of oil and of gas can be brought under absolute control by gauging the size of wick or burner to the work to be done.

2. The oven in which the food is to be subjected to this measurable and controllable source of heat must be so constructed that the heat imparted to it may be entrapped and accumulated up to a certain measure or degree, and then maintained at that temperature without substantial variation, until the work is done. This can be done by jacketing the oven in a suitable way with material which is incombustible and also a non-conductor of heat.

3. There should be no direct communication between the true oven or receptacle in which the food is placed and the source of heat, lest the products of incomplete combustion should sometimes taint the food, and lest the food should be exposed to being in places burned or scorched.

These three conditions are all accomplished in the two somewhat crude and probably incomplete inventions which I have named the "Aladdin Cooker" and the "Aladdin Oven," in both of which the heat derived from common lamps, such as are used for lighting, may be stored or accumulated so as to do the work of cooking in a very perfect manner. In the cooker the heat is imparted to water in an attachment to a metal-lined wooden box, corresponding to the water-back of the common range or stove, and the work is done by the contact of the hot water with the outside of the porcelain vessels in which the food is placed, or by the steam generated when the water is heated to a boiling-point.

In the oven a column of heated air is carried from the chimney of the lamp to the inside of an outer oven, made chiefly of prepared wood-pulp, but outside of the inner sheet-iron or metallic oven in which the food is placed, which inner oven is separately ventilated.

I do not claim any originality in these simple principles, or in the idea of jacketing an oven with non-conductors of heat. All these matters are well understood by every intelligent stove-manufacturer; but it is practically impossible for any one to apply them in making stoves such as will meet the demand of the market, for two reasons:

1. The greatest demand for stoves is that of people of very moderate means, who are too much controlled by the price in making a choice, making the common error in confounding cheapness with low price—an error which leads to great waste, not only in the matter of stoves but in many other ways.

2. The absolute and imperative preference of the public for a stove in or upon which the work can be done very quickly.

The custom of cooking quickly is in part a matter of choice, and in part due to the necessity to which a great many working people are subject, to cook their meals quickly or else to go without hot breakfasts and dinners.

Another great obstruction to improvement in the art of cooking is the almost universal misconception that the finer cuts of meat are more nutritious than the coarser portions, coupled with an almost universal prejudice among working people against stewed food. This prejudice is doubtless due to the tasteless quality of boiled meat: boiling toughens each of the fine fibres, and deprives the meat almost wholly of its distinctive flavor.

All these blunders and misconceptions must evidently be removed before any true art of cooking can become common practice.

The more necessary, however, does it become to invent apparatus in which meat can only be simmered and cannot boil, as in the Aladdin Cooker, and also to invent a stove or oven in which neither meat nor bread can be over-cooked, dried up, or rendered indigestible by too much heat, as in the Aladdin Oven.

Next, people must be persuaded that a better and more nutritious breakfast can be made ready to eat, as soon as the family are out of bed, by putting meat stews, oatmeal, brown bread, and many kinds of puddings, into the oven or cooker and simmering all night by the use of a single safe lamp, than in any other way.

People must be taught that the dinner can be put into the oven when both husband and wife go to the mill to work, and so treated that it may be found perfectly cooked at noon, without requiring any attention in the interval.

People must be taught that the best of bread, raised with good yeast, can be mixed and kneaded between 12:30 and 1 P. M., placed in a bread-raiser, which will raise it ready for the oven at 6 or 7 P. M., and that this bread may be perfectly baked in two hours, by the heat of the evening lamp, which at the same time serves to give light for reading or sewing.

All this can be accomplished with my crude apparatus, but, until some skilful stove-makers take up these inventions and make the ovens in large numbers, at low cost, my own efforts must be directed mainly toward ameliorating the condition of the rich, saving the houses of the well-to-do from the heat and smell of the present bad methods, and in this way creating a demand for my ovens which, while made in small numbers by hand-work, are too costly for general use, although in an ordinary family they will pay for themselves in six months.

I have ventured to call the attention of the Public Health Association to these matters because I have been led, by the study of the statistics of the cost of subsistence, to certain conclusions which are wholly in the line of your work.

I venture to ask you if it is not a fact that bad and wasteful methods of consuming food are not a most potent cost of inability to work to the best advantage? Are they not more promotive of disease, and, in fact, a more subtle cause of want in the midst of abundance, than even the waste on fermented and spirituous liquors?

From my own observations, I am of the opinion that dyspepsia is a cause of more disability than intemperance, although this proposition is not capable of statistical demonstration.

Material life consists in the conversion of forces, or in the application of material products, to the supply of the necessities of life. In the line of absolute necessity food comes first, clothing next, and shelter third. The supply of the materials for meeting these needs of the body is superabundant; comfort and welfare depend upon the relative proportion of the materials used, or upon the direction which may be given to the conversion of these forces. The result of each year's work is a given product: whether that product shall be adequate or otherwise depends almost wholly upon individual intelligence. In respect to the great majority of all who perform the actual manual or mechanical work of production, if the expenditure for food and drink is unduly large, then either clothing or shelter must be restricted; a small part of the waste of food, on which half the income is spent, might, if saved, enable the family to double the expenditure for a dwelling-place. It follows that the most difficult question with which practical reformers are called upon to deal, viz., that of providing more ample and comfortable dwellings, may be solved by altering the conversion of the present product, even if that may not be increased, so that what is now, in part, wasted on food and drink, may be spent for better shelter, and yet the family may be more fully nourished than at present. I do not claim absolute accuracy for the following proportion of expenses in working-men's families, but I am quite sure they are near enough to the mark to serve as an example.

In a family of five adults, or of four adults and two children, ten or under, making an average family of five persons, in which one half the income is spent for food and fuel, twenty-five cents a day per adult being spent for food, the corresponding average expenditure per adult,—

For clothing will be	7 to 9	cents
For liquor it may be	2 to 4	"
For sundries it will be about	5	"
And the remainder for rent or shelter, if no liquor is used	9 to 11	"
If liquor is used	7 to 9	"

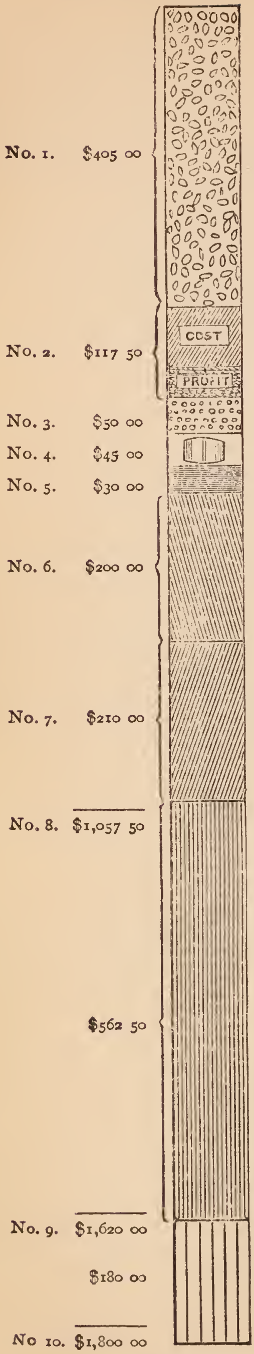
Now, I think it is very safe to put the waste of food material at twenty per cent., or five cents a day; if this misspent force and one half the average cost of liquor, or two cents a day, could be converted into shelter—that is to say, to providing a more ample dwelling by either buying or leasing—it would suffice to enlarge the present quarters by one half to three fourths. Five cents per day per adult comes to $1,000,000,000 or more a year, counting two children of ten or under as equal to one adult. But the greater benefit which would come from a true art of preparing food would consist in the increase of the productive force of the community, so that the provision for dwelling might be increased both absolutely and relatively. I might add another treatise to this, on the waste of force in bad building, and from the common practice of what I have named the art of combustible architecture; but time will not serve. Suffice it that the product of this nation is more than ample for the abundant subsistence, the adequate shelter, and the complete clothing of every family in it; yet we witness want in the midst of plenty, because we waste enough to support another nation at the standard of French economy and thrift, especially in the matter of food.

I may now venture to call your attention to some of the very subtile points which are brought out by the statistical investigation of the food question. I suppose that there is no kind of meat which is consumed so generally, or in such large quantity, as pork; yet, according to the chemical and physiological data, the conversion of Indian corn into pork, at the rate of one thousand pounds of corn to two hundred pounds of pork, results in a waste of practically all the protein and nearly all the starch, and gives a residuum of fat, of which most people get too much in the other kinds of food which they consume. Yet it would be useless to try to abolish pork from the common dietary. I sometimes wonder if the Hebrew law-givers were not good economists when they condemned the use of pork, or whether they were guided wholly by sanitary considerations.

Chariton, Iowa

October, 1883.

Glyndon



No. 1, $405, is the price which the farmer receives in Iowa, at 90 cents per bushel; $360, in Dakota, at 80 cents per bushel.

No. 2, $117.50 is the charge made by the railway for moving 450 bushels of wheat from Chariton to Chicago, and 100 barrels of flour thence to Boston, $197·50; Glyndon to Minneapolis and thence to Boston, $82.25; cost of railroad service at 70 per cent., $138.25 of the total charges.

$35.25 profit, at 30 per cent., $59,25.

No. 3, $50, cost of milling.

No. 4, $45, cost of barrels.

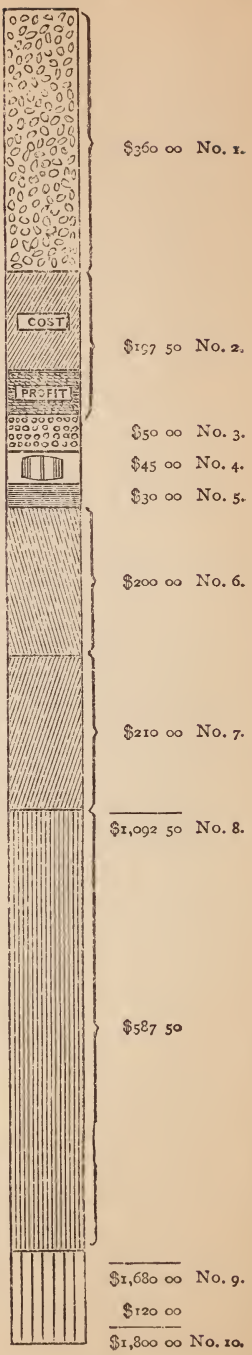
No. 5, $30, merchant's commissions and cartage in Boston.

No. 6, $200, cost of labor in making 100 barrels flour into bread in a small bakery.

No. 7, $210, cost of fuel, yeast, salt, etc., used in converting 100 barrels flour into bread.

No. 8, final cost of bread ready for distribution, average 3½ cents per pound; varying a little with the quality of the flour and the quality of bread. Iowa flour yields 270 and 290 pounds per barrel; Dakota flour yields 280 and 300 pounds per barrel.

No. 9, the price which the poorer people of Boston pay for poor bread, made from a medium grade known as "baker's flour," averages not less than 6 cents per pound, which makes the cost of distributing 100 barrels of Iowa flour baked into bread, No. 9, $562.50, and 100 barrels Dakota flour, $587.50 at the minimum yield of 270 and 280 pounds bread to the barrel. When either kind of flour is treated so as to yield 300 pounds bread to a barrel and sold at 6 cents per pound, $180, or $120, is added, and the final cost of the bread to the consumer is at the rate of $18 per barrel of flour, No. 10.



The foregoing table was made in 1883, when wheat was worth ninety cents a bushel on the far Western farms. The price of wheat, and the charges for transportation and milling, are now lower. The cost of distributing bread is now greater in proportion than it was in 1883

Again: The present crop of wheat calls for fifty thousand tons of twine for binding it upon the self-binding harvester; the cost of binding wheat by hand was five to six cents per bushel, and it required a small army of agricultural tramps, who charged almost any price when needed to do this work. The self-binder reduced this charge to not exceeding one cent and a half per bushel. This reduction, which finally took effect two or three years before the resumption of specie payments in this country in 1879, was one of the principal factors in enabling us to export wheat profitably and vastly in excess of anything previously known; and it was upon the margin of exports over imports, consisting wholly of wheat, that we were enabled to import gold in sufficient measure to resume specie payment. Yet this all turned on tying a knot by the machine instead of by hand.

Again: I will present to you my diagram of the loaf of bread, which I have frequently used in other ways. You will observe that, with wheat at about the present price, bread can be made and can be sold in a very large way, at three to three and one half cents per pound; but if the bread is distributed in the customary manner by way of small shops or by delivery on the part of the bakers themselves, you will find that the price of bread ranges from five to eight cents a pound, according to the quality.

Now, in this oven made of paper, any person of ordinary intelligence, who is willing to devote twenty minutes to kneading bread—which requires more muscle than it does mind—then placing it in the bread-raiser, following a certain rule, taking it out at a given time and putting it in this oven over this lamp, can make better bread at three to three and one half cents per pound than any baker's bread which can be purchased. Here are samples of the bread; you can taste it for yourselves. I devoted two evenings to learning how to make bread; and I baked these loaves, some of which I made myself, by the heat of the evening lamp which lighted my library table while I was reading my evening paper.

I have said that a saving of five cents per day *per capita* might readily be made in the food-supply of an average family. The customary ration is from three fourths of a pound to a pound; in the families of poor people, who depend very much upon bread, I suppose it is one pound. Now, wherever such a family is paying six cents a pound for wheat bread, not an uncommon price among the poor in Boston, a saving of two and one half cents a day can be made on bread only, by making it in the family and baking it in this oven.

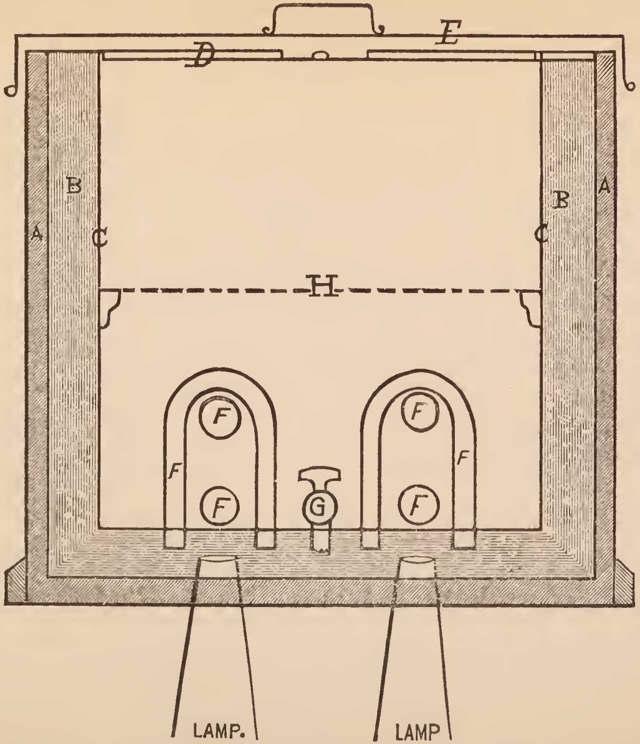
But, again, this possibility leads to another consideration. It is conceivable that all the bread may by and by be made in this way. Then what would become of all the bakers? They would for a time suffer for want of work; but you will observe that in this, as in most of the actual improvements in the conditions of society, the art which would be displaced is one of the most onerous kinds of labor, requiring long hours of night work, a greater abundance of bread would be furnished

ALADDIN COOKER.—(Trade Mark.)

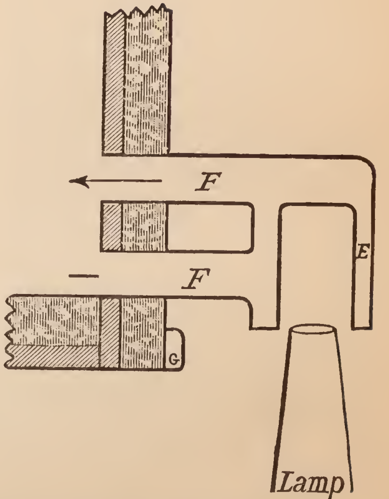
Double size as drawn, 20 x 20 x 20 deep. Single size, one lamp, 10 x 10 x 20 deep. Scale, one-tenth to one inch.

SPECIFICATION.

A.—One-inch board.
B.—Two inches saw dust.
C.—Copper lining.
D.—Copper inside cover.
E.—Cover, board, tin or copper.
F.—Inverted copper cone and connections in which the water is subjected to the heat of the lamp.
G.—Faucet.
H.—Perforated shelf.



This cooker should be set upon a table about twenty inches high, served with large or small lamps as the work may require.



Water must always be kept above the level of the upper arm of the copper cone *F*, and had better be kept as near to *H* as the pots used for the food will permit. If heavy ten inch stone pots with covers are used, the meat inside will simmer in its own juice while the water outside boils. The steam generated will cook food placed in proper vessels on the shelf *H*. The wood on the side toward the lamp should be protected with tin.

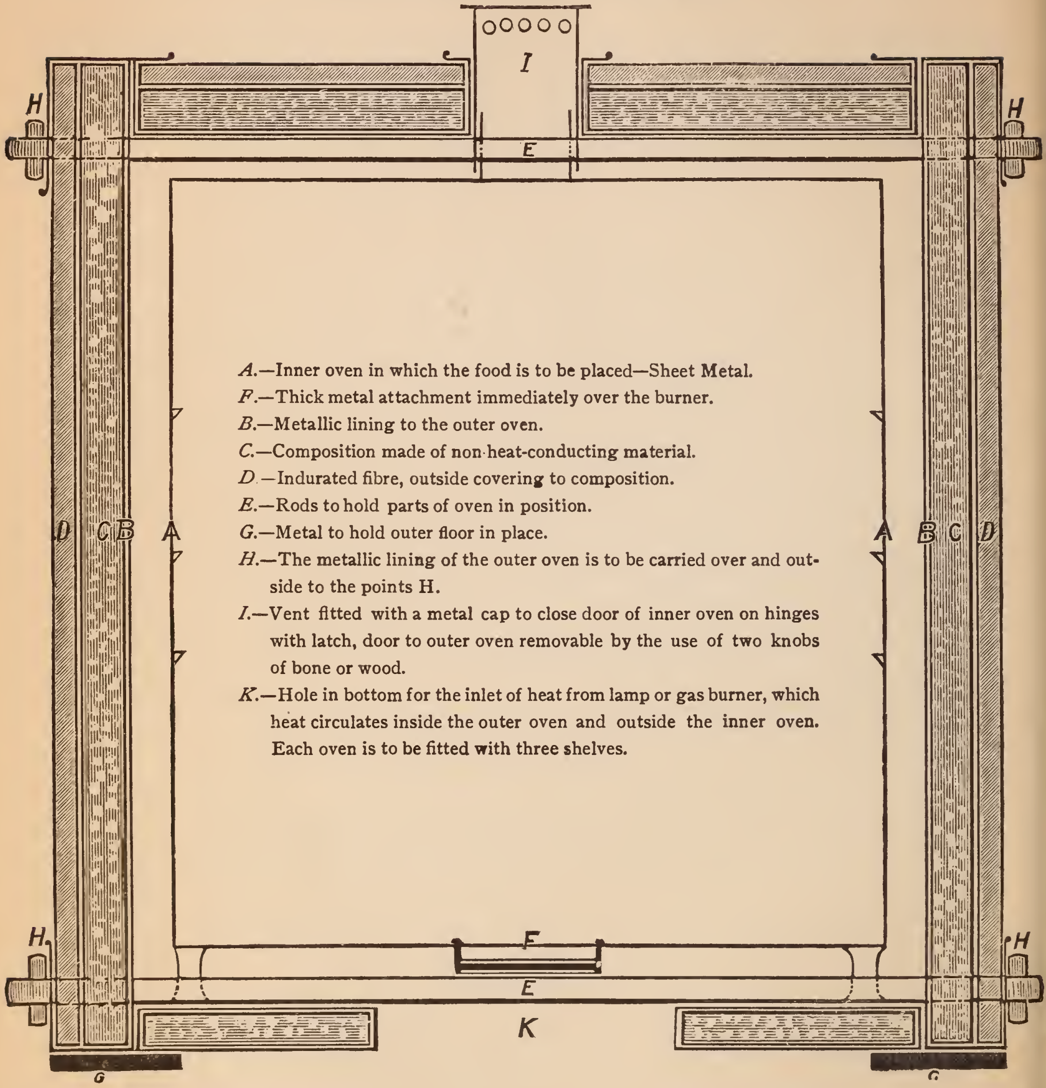
at less cost, and presently the bakers would be absorbed in other branches of work. How that happens, and how such adjustments are made, I suppose no one knows. There was formerly one branch of cotton spinning, viz., the sizing of the warps, which was conducted under very uncomfortable if not unwholesome conditions. The old-fashioned dressing-machine, as it was called, on which all the warps of cotton goods were prepared with starch for weaving, was worked in a room at from 110° to 120° Fahr., the atmosphere being impregnated with the smell of sour starch, and in a given factory the work of eight men was required. In the year 1866 I was myself instrumental in importing two machines of a new kind from Great Britain. These machines were operated in a light, cool, and well ventilated room: a man and a boy did the work of the eight men. What became of the other seven men? I never could trace them: they were merged in the great body of workmen. The new machine has wholly displaced the old one, and there is now no branch of work in the cotton mill which is considered injurious, or subject to any great discomfort. In fact, when the final application of invention is made to the cotton factory by using ice or other methods of cooling the air in summer, as we use fuel to heat the rooms in winter, the atmosphere of the cotton mill will become about the most salubrious that can be obtained, for the reason that the exact degree of heat and humidity which is called for in the best work in spinning and weaving is consistent with the exact degree required for the health of the human body; and since electric lighting has displaced the noxious vapors of illuminating gas, it may soon become possible to secure workers in a cotton mill on the ground that a cotton mill is the best sanitarium.

I have given you these last few data, which are not immediately connected with the art of cooking, to show you how "far afield" the figures of food may follow one who tries to find out their full meaning. I will now present to you the diagrams and description of the cooker and of the oven, and will presently invite you to test the quality of the food which has been prepared while I have been speaking. These two diagrams were first prepared in a rough way for a newspaper. The form of the heater to the Aladdin Cooker has been changed, and some cross sections have been introduced, in order to increase the heating surface. The Aladdin Oven is made at the present time of a different shape and in a different way, but the two diagrams will show to you the two conceptions on which the whole matter is based.

I have a strong suspicion, or I may even say a growing confidence, that I have really accomplished what Count Rumford undertook to do, but which he failed to establish permanently for want of a fuel like kerosene oil or gas, which can be controlled, regulated, and thoroughly consumed.

I may have spent a thousand dollars, more or less, in developing this subject. The present very simple forms of apparatus have been adopted after considerable money had been wasted in more complex methods of reaching the same results. I believe this is the course in almost all

THE ALADDIN OVEN.—(Trade Mark.)



A.—Inner oven in which the food is to be placed—Sheet Metal.

F.—Thick metal attachment immediately over the burner.

B.—Metallic lining to the outer oven.

C.—Composition made of non-heat-conducting material.

D.—Indurated fibre, outside covering to composition.

E.—Rods to hold parts of oven in position.

G.—Metal to hold outer floor in place.

H.—The metallic lining of the outer oven is to be carried over and outside to the points H.

I.—Vent fitted with a metal cap to close door of inner oven on hinges with latch, door to outer oven removable by the use of two knobs of bone or wood.

K.—Hole in bottom for the inlet of heat from lamp or gas burner, which heat circulates inside the outer oven and outside the inner oven. Each oven is to be fitted with three shelves.

inventions. I do not intend to become a manufacturer of ovens. I have made an arrangement with Messrs. Kenrick Brothers, of Brookline, who now make them on orders by hand work, crediting me with a moderate commission, from which I may ultimately recover what I have spent, although I have no great expectation of doing so. The ovens cost too much while they are made by hand. It is my hope that some regular stove manufacturer may take up the subject at the point to which I have brought it, and make a business of introducing my apparatus on strictly commercial methods.

The price of the standard Aladdin Oven, like these which are before you, at the present time, is twenty-five dollars without the lamp, boxed and ready for delivery to express or railway. I hope they may ultimately be furnished, when made in a large way, for a considerably lower price; but even at the present price they will pay for themselves in economy of fuel, in economy of food, and in the comfort of those who do the work, in a very short term of weeks rather than of months.

I began the study of cooking apparatus many years ago, when endeavoring to aid factory operatives, during the period of very high priced cotton, in supporting themselves on the wages which they could earn while the mills were running short time; and I had substantially conceived the "Aladdin Cooker," but I did not then follow up the subject so as to enable me to boil water in this apparatus by means of a lamp, kerosene oil not then having been introduced for such purpose. Moreover, I was under the old superstition that it was necessary to have a heat at or above the boiling-point in order to cook at all. Even Count Rumford found out by accident that meats could be cooked at a lower degree, and it was not until I happened to read Dr. Mattieu Williams's "Chemistry of Cookery" that I was led to develop the Norwegian cooking-box into the cooker with the heating attachment.

Perhaps I unwisely gave away this idea or conception which I might have patented. I had the impression that it would be adopted more rapidly, but the public have become so accustomed to the patent system in this country as to make it almost impossible to give away even an idea. I doubt if this is altogether a wholesome condition, when manufacturers wait so long for the protection of a patent before undertaking to make a good thing on a commercial scale. Nevertheless, one must accept the fact, and the cooker has not been taken up by any manufacturer. Warned by this lesson, I applied for a patent on my first "Aladdin Ovens," which were made wholly of metal, the outer oven being packed with non-heat-conducting material, but on this application I failed. This identical apparatus had been invented fifty years ago, the heat being derived from a pan of charcoal, and the patent had expired; of course the charcoal did not meet the necessary conditions. I found, however, that the oven made wholly of metal packed with carbonate of magnesia or fossil meal would be very expensive; moreover, the outer metal skin wastes a great deal of heat. I then experimented with various compounds, and finally adopted the material of which these ovens are made, known as "indurated fibre" or paper pulp, prepared in a certain way under a patent and baked at a high heat. I applied for a patent on a oven made in this way, but the mere substitution of the pulp for the metal did not suffice to give me the patent asked for. There is therefore no patent on the construction of either of these devices. The names "Aladdin Cooker" and "Aladdin Oven" are my trade-marks, on which I may hope to hold a certain control, so that the ovens shall be made of safe material, incombustible at any degree of heat required for the work, and from which control I may possibly recover the money which I have spent on my experiments. If I do not, it will be my contribution to the public service; and if by this contribution I can do away with even a small part of the waste of good food material and with a small part of the indigestion caused by bad cooking, I shall consider myself fully compensated.

Under such conditions I may perhaps venture upon the ordinary method of citing the testimony of some of the few persons who have bought these ovens and who have made use of them. I will first give a copy of a letter from an elderly lady who visited my office with her daughter. The latter was very skeptical as to success in working my apparatus: the oven was, however, bought, and has been in use during the past summer. Her testimony in regard to it is as follows:

I am glad to tell you that I like the Aladdin Oven very much indeed. My dinners for the last three months have been cooked in it with success and economy, and the kitchen never overheated. It saves material, fuel, and labor, as well as heat. It is an immense comfort as well as economy. It bakes bread and cake nicely, and we have only used coal for laundry purposes. I wish it could be produced at a cheaper rate, though I would not lose mine for twice its price.

I may venture to give a certificate from another lady who has tried the apparatus, as follows:

1. In respect to economy in the use of material for food: All remnants of food can be served again without drying or losing any of the fresh flavor. With any skill, therefore, "made dishes" can be produced until the first material is used up.

2. In respect to comfort of the kitchen: It goes without saying that a room in which only a lamp is burning is cooler than one with a fire in an iron stove.

3. The cook says it is much less work; but I find they sometimes from force of habit throw the fuel into the stove and cook there rather than take the trouble to use the oven.

Lastly, general conclusions: It is of inestimable value in warm weather, and saves two hods of coal a day when it is used half the day. For an apartment house or in small kitchens it will be a great boon. With an intelligent, care-loving woman it will go much further and do better work, of course, than with the ordinary cook, though it is so simple that any one can use it.

In a third letter, the testimony is as follow:

My general conclusions in regard to health and appetizing conditions are,—Bread from the oven is much more wholesome than from the range, because of the slow, even, and thorough baking. Meats are more wholesome, because the juices are entirely preserved and the fats not overdone. The greatest advantage, perhaps, is the possibility of so regulating the temperature as to preserve fine and delicate flavors at the same time that the most wholesome results are secured.

I am allowed to make use of the following statement of Dr. Merrick Bemis, one of the leading physicians in Worcester, of long practice and great experience:

HERBERT HALL, WORCESTER, MASS.,
September 25, 1889.

TO WHOM IT MAY CONCERN:

This is to certify that I have had the Atkinson Oven or Baker in use at my house, and have quite fully tested its merits.

Vegetables and meats were cooked in the oven in my dining-room without giving off any perceptible odor.

The cooking was exceedingly well done, without scorching or drying. The meats were tender, juicy, and of unusually good flavor.

Puddings and pies were not only well cooked, but were ripened, so to speak, as it seems to me they could be by no other process with which I am acquainted.

The work is accomplished without care or concern, and at a merely nominal expense.

Food is not only much more cheaply cooked by this process, its value is greatly enhanced. It is more nutritious, and it is more digestible, thus promoting health and longevity.

It is not easy to estimate the full benefit which might be derived from the adoption of this cheap, wise, and healthy mode of preparing food.

(Signed) MERRICK BEMIS, M. D.

This is the most complete justification of my theories in regard to scientific cooking that I have yet received from any one, and has given me great satisfaction.

Finally, I am permitted to give the following extract from a note from Mrs. Ellen H. Richards, whose excellent work in industrial and household chemistry is doubtless well known to you.

I submitted the early types of my oven to an investigation which was conducted under her direction by Miss Marion Talbot, whose thoroughly scientific report upon the diffusion of heat and other matters encouraged me to go on, and was wholly consistent with my own experiments and with all the evidence which I have since obtained. This latter report is too long for inclusion in the present address. Mrs. Richards's present statement is as follows:

It seems to me that the mission of the Oven and Cooker is in the ideal life of the twentieth century, as shown by Bellamy;—that is, when the people of the middle classes, as we know them now, shall pay attention to the question of food, and when the present kitchen and cook shall be abolished; when in each section we can buy a chicken ready dressed for the oven, a fish all washed and stuffed; when we can get bread and pastry such as we like; in short, when we have places like the Women's Exchange on Boylston Street in each ward or village—then we shall use the Aladdin Oven, to dispense with kitchen and cook; but until then it will come into use only as an accessory, and especially in summer.

Unskilled hands can get much better work out of it than out of an ordinary range, chiefly because it cannot be overheated, and things cannot be burned to a crisp.

Our people need to learn what is to them a new art, the delicate flavoring which is brought out only by time,—that is, by *slow* cooking.

When a stew deliciously flavored is to people better than *crisp* beef, then the oven will go; but the majority of our people are still barbarians in taste, and it will not do to claim too much.

I am sure that the conditions of slow cooking are very favorable to ease of digestion, and that the digestibility of many things is very much increased.

> I am sure that economy lies in the use of material which is much less expensive, but here again we must learn to like the result.
>
> In summer the saving of fuel is very great; in winter most people need the fire—often the kitchen is the only fire.
>
> Educated housekeepers with their own hands must work it up. Servants will not learn anything new unless working with the mistress.
>
> I believe the idea is destined to give a much needed relief to multitudes of over-worked women, just as soon as they can be convinced of the possibility of relief.

I cannot perhaps wonder at the difficulty in getting many people to try this stove, for the reason that it was a very long time before I could satisfy myself that it was *a fact* and not *a fad*. The fact that I could send two ovens to this hall, have them set up here on the day of this address, place them in charge of a cook who had never seen them, with delay in getting the lamps for use, and yet to serve to you this taste of the method of cooking, may suffice to convince you that there is merit in the suggestion of slow cooking in a jacketed oven.

During the past summer my family have been at the seaside on Buzzard's Bay one hundred days, numbering seven at the minimum, during a large part of the period ranging from fourteen to sixteen inmates; the average at least ten. The cost of the provisions has been what is customary in a well-to-do family, in which no special attention is given to close economy in the purchase of materials, to wit, 100 days' rations for ten people is equal to 1000 days' rations, 3000 meals. The cost of food and fuel has been almost exactly fifty cents a day for each person. I cannot give the exact items, but the division is substantially as follows:

Meat	558 lbs.	$129.58
Poultry	97 "	30.40
Fish bought by tale and not by weight, scup, tautog, blue-fish, and the like, about 350 lbs.		50.00
Vegetables		35.70
A few vegetables grown on the place, not estimated.		
Grocery bill, which included also some vegetables and fruit		190.35
A few special supplies sent from Boston, say		13.97
Milk		50.00
Total,		$500.00

No coal was used during the summer; the stove was heated only for laundry work with oak chips from my own wood lot; I think the value of the oak chips might be fairly set off against the value of the oil which was used for lighting the household; but I will assume $2.50 added to the oil in the estimate of the fuel used for cooking; the oil, purchased at retail, five gallons at a time, amounted to fifty gallons at fourteen cents, $7.00; deduct for lighting $2.00; add oak chips $2.50; total cost of fuel for 3000 meals, $7.50; say one fourth cent per meal. I do not, however, regard this economy of fuel as of any material importance compared to the economy of heat in the summer kitchen, and the quality of the food.

The food supplied to you this evening consists of about twelve pounds of veal and ham cooked together with a white sauce, which I have called "Sam Weller hash."

Ten pounds of halibut a la creme;
A rock bass as large as I could get into the oven; about four to five pounds.
Six pounds of mutton cooked with brown sauce.
Two sirloin steaks.
One dish of tomatoes.
One dish of squash.
One dish of cauliflower.
One dish of custard pudding.

The two latter were cooked on the same shelf with the fish in the same oven. You will not detect any flavor either of fish or cauliflower in the custard. [None could be detected.] The only failure to-night is that the cauliflower is not sufficiently cooked, owing to delay in procuring the lamps. The expenditure of oil this evening on these two ovens I compute at about three pints or less.

In addition, I have served to you from the Aladdin Cooker, the simmering machine,—

One grouse,
One jar of soup stock.
One jar of corn meal.
One jar of oat meal.

It was rather rash for me to undertake this work under such disadvantages: but whether or not the food is in satisfactory condition is for you to say. No attention has been given to fine work in seasoning, as I desired you to test the natural flavors of each kind of food.

I may venture to subscribe myself, especially in this presence, by the use of the same words which I once adopted as a motto in my treatise on the "Missing Science of Cooking." I am—

COCTOR NON DOCTOR.

[Since this lecture was given I have prepared a special oven for the Eye and Ear Infirmary of Boston, to be used in sterilizing instruments, dressings, and bandages at a uniform heat of 300° F. It seems to be a complete success, and requires only moderate attention to the gas-burner from which the heat is derived.—E. A.]

XXVI.

RECENT RESEARCHES RELATING TO THE ETIOLOGY OF YELLOW-FEVER.

BY GEORGE M. STERNBERG, MAJOR AND SURGEON U. S. A.

[ABSTRACT.]

The investigation in which I am engaged under instructions from the president of the United States, and in pursuance of authority of an act of congress, approved March 3, 1887, "making appropriations for sundry civil expenses of the government," is not yet completed. The cultures which I have brought with me from Havana will require further study; and extended comparative researches will be necessary before a definite conclusion can be reached as to the specific etiological relation of one or the other of the micro-organisms which I have obtained from yellow-fever cadavers, principally from the intestines.

Owing to the facts mentioned and the limited time at my disposal, I can only give a brief general statement of the present status of the inquiry in which I am engaged, and of the methods of research which have been employed. But in my final report a detailed account will be given of the various micro-organisms encountered, and of the numerous experiments made upon the lower animals.

Having remained in Havana from the middle of March until the first of September of the present year, I have had ample opportunity to obtain all the material necessary for a thorough research by modern culture methods. Thirty autopsies have been made in typical cases of yellow-fever, most of which occurred among Spanish soldiers admitted to the military hospital in that city.

My cultures have been made for the most part in flesh-peptone gelatine, and in agar-agar jelly containing five per cent. of glycerine: numerous cultures have also been made in sterilized blood serum, in veal broth, and in *agua coco*. The last mentioned medium I used to some extent during my visit to Havana in 1879, as a member of the Yellow-Fever Commission of the National Board of Health. During the past summer I have used it extensively, and find it to be an extremely valuable culture-medium, which is as transparent as water, and yet contains a large amount of nutritive material. It has a specific gravity of 1020 to 1025, a slightly acid reaction, and contains in solution a considerable amount of glucose. Both aerobic and anaerobic cultures have been made in the various media mentioned, into which have been introduced blood obtained from one of the cavities of the heart, material from the interior of the liver, the spleen, and the kidney, urine drawn through the walls of the bladder, and material from the stomach and intestines.

A method, which has also been pursued in the entire series of cases, consists in the preservation of a piece of liver or kidney, the size of a man's fist, in an antiseptic wrapping, by which the exterior is surely sterilized, and the entrance of germs from without is guarded against. Such a piece kept in the laboratory for forty-eight hours as a rule preserved its fresh appearance and had no odor, but, upon cutting into it, it was found to contain numerous and various micro-organisms. The cut surface had a decidedly acid reaction. The micro-organisms found under these circumstances were bacilli of various species, and corresponding with those found in the contents of the intestine. They have been isolated by the use of Esmarch tubes, and carefully studied. Possibly one or the other of them may be the veritable yellow-fever germ, but up to the present time no satisfactory evidence has been obtained that such is the case. The bacilli which have been found most constantly by this method are,—

A large, motionless, anaerobic bacillus, resembling in its morphology the bacillus of malignant œdema. This is very commonly present, and is conspicuous by reason of its abundance and dimensions. In my list of micro-organisms encountered, it is designated by the letter "N."

The *bacterium coli commune* of Escherich, very common.

A motile, non-liquefying bacillus, resembling *bacterium coli commune* in its morphology, but more pathogenic for rabbits and guinea pigs, a facultative anaerobic, very commonly present—my bacillus x.

A short, motionless bacillus, in chains, resembling the bacillus of Babès, a facultative anaerobic, not pathogenic for rabbits or guinea pigs; found in a limited number of cases only—my bacillus o.

The presence of these various micro-organisms in liver obtained at an autopsy made soon after death, and preserved in an antiseptic wrapping, may be taken as evidence that they were present in small numbers at the moment of death; but the examination of "smear-preparations" made immediately after death, and culture experiments made at the same time, show that they are not numerous, and in a considerable proportion of the cases the result of such immediate examination of the fresh liver tissue has been negative.

It is an interesting fact that material from a piece of liver kept as described, and containing the micro-organisms referred to, is very pathogenic for guinea pigs when injected subcutaneously in small quantities—2 to 5 minims—whereas the fresh liver tissue may be injected in considerable amount without producing any noticeable effect. This pathogenic power is due to the micro-organisms present, and especially to my bacillus "N" and to my bacillus "x." Details of experiments will be given in my final report.

Material from the intestine, also, which contains the same micro-organisms, is very pathogenic for guinea pigs.

At the close of my address I shall exhibit upon the screen photo-micrographs of the bacilli referred to, and also of the various micro-organisms which have been claimed to be the specific germs of yellow-fever, viz.,—

The micrococcus of Dr. Domingos Freire, of Brazil—his so called *cryptococcus zanthogenicus*.

The *tetragenus febris flavæ* of Dr. Carlos Finlay, of Havana.

The liquefying bacillus of Dr. Paul Gibier—my bacillus "g."

I may say with reference to the micrococcus of Freire, that I have not encountered it in any of my cultures from the blood and tissues of yellow-fever cadavers, and that my extended observations fail to give the slightest support to his claim.

The yellow-fever germ of my friend, Dr. Carlos Finlay, of Havana, which I have named *micrococcus tetragenus versitilis*, is one of the most common atmospheric organisms in the city of Havana. I have frequently obtained it in cultures made from the surface of the bodies of patients in the hospitals in that city, and also in Vera Cruz; but it is not present, unless by rare exception, in the blood and tissues of yellow-fever patients.

The liquefying bacillus, which Dr. Paul Gibier isolated from the intestine in a limited number of cases, I have also obtained from the same source in about one third of my autopsies; but it is not constant, and, when present, is not abundant. I see no good reason for supposing that it is the specific infectious agent in the disease under consideration.

XXVII.

THE NECESSITY FOR A MORE RIGOROUS INSPECTION OF MEAT-PRODUCING ANIMALS AT THE TIME OF SLAUGHTER.

BY D. E. SALMON, D. V. M.,

CHIEF OF THE BUREAU OF ANIMAL INDUSTRY, WASHINGTON, D. C.

The intimate relation which exists between the diseases of animals and those of mankind is being more clearly recognized as the nature and origin of communicable maladies are more closely studied. The inoculability of bovine variola upon the human species, and its wonderful effects in conferring immunity from small-pox, is an illustration of this, long admitted, and which we all have had occasion to observe. The contraction of anthrax or malignant pustule by man from animals affected with this disease, of trichinosis from eating trichinous pork, of tape-worm from consuming the flesh of animals infested with this parasite, of glanders from coming in contact with glandered horses, are all examples which show the necessity of protecting our human population from the animal and vegetable parasites which may inhabit the bodies of our domesticated animals. More recently we have seen the demonstration that tuberculosis, the most common and fatal of all the affections of mankind, is a parasitic disease, and one which affects animals as well as men; that the parasite found in tuberculous animals is morphologically, and probably in all other respects, identical with the parasite found in tuberculous men; that the disease is communicable from animal to animal, and from man to animals. If it has not been proved that this disease may be communicated from animals to man, it is undoubtedly because we are not able to make the experiments required for a scientific demonstration; but the probability is so great, that it is the duty of sanitarians to accept this mode of origin of human tuberculosis as a fact no longer to be ignored.

There may be diseases of man that are derived from animals, and the origin of which has not yet been recognized, and which will be brought out by the investigations of the future; but whether there are or not, the clear connection in the maladies referred to should be enough to interest all sanitarians in the efforts to eradicate the plagues of domesticated animals, and to prevent the carcases of those that are affected by them from being used for human food. This interest, which is common to those charged with the duty of protecting the health of people, and to those who guard the health of animals, leads me to ask your attention more directly to the question of slaughter-house inspection than I have ventured to do at previous meetings.

The present method by which the animals of nearly the whole country are gathered together at a few points for slaughter, while it is objectionable for some reasons, is the ideal plan where a cheap and thorough inspection is to be made. Long before dressed beef was shipped in refrigerator cars the sanitarian saw the desirability, in fact the absolute necessity, of lessening the number of slaughter-houses before any systematic and thorough plan of inspection could be adopted. Now that the business men themselves have made this concentration, the time has come to take advantage of the favorable conditions, and obtain an inspection which shall, so far as possible, protect the consumer of meats from the diseases which they are liable to convey.

It is remarkable, after all that has been said in the last half dozen years about the dangers of contracting tuberculosis from eating the flesh of cattle affected with this disease, that there are few if any places in this country where animals are properly inspected at the time of slaughter. It is almost unnecessary to add that those affected with tuberculosis are not discovered, and that consequently the carcases are not condemned. This disease is apparently becoming more prevalent among the cattle of our country, and its effects upon consumers can no longer be overlooked.

The kind of inspection that is made is also a matter of considerable importance. An inspector should know the nature of the more common lesions which are found in slaughtered animals. He should certainly know a tubercle and a tape-worm cyst when he sees them; but some inspectors that we meet are not so well educated as this. With inspectors ever so competent, the inspection is useless unless properly performed. No man can look at a bunch of cattle as they stand in the stock pens, and say that they are all healthy and fit for food; nor yet can he glance over the carcases after slaughter, and with any certainty find those which should be condemned. He should be present at the time of slaughter, and carefully examine the viscera of each animal.

There are few who realize the number of seriously diseased animals which are slaughtered for food. I presume our butchers are no worse than those of other parts of the world, and I see no reason for believing that they are any better. The control which the Bureau of Animal Industry has exercised over the cattle trade during the effort to eradicate bovine pleuro-pneumonia has given facilities for learning many things which previous to that time were only suspected. One of the things which we learned was, that there are slaughter-houses in all cities in which our work has been carried on, where the worst diseased cows could be taken and slaughtered and the carcases disposed of for food. Nor were the cases exceptional where this was done: on the other hand, it was exceptional for many of the owners of affected herds to allow an animal to die of the disease. They were taken to the slaughter-house before the fatal period arrived. What was true of pleuro-pneumonia in this respect is true of tuberculosis and other diseases.

This condition of affairs is not a credit to the intelligence and civilization of the country. With a population of sixty-six millions, and a death-rate of not less than 165,000 per annum from tuberculosis alone, we should adopt more rigorous measures to maintain the healthfulness of our food-supply. If it cannot be made impossible for animals affected with serious and dangerous diseases to be slaughtered and their carcases sold for food, such regulations should be adopted as will at least make this of rare occurrence.

The commercial reason is one which should not be left entirely out of consideration, even before this body, which is primarily interested in the question simply in its effects upon the public health. We all know that there are sometimes things which we think ought to be done, and yet which it is inexpedient to do. And so, before undertaking any great reform, we generally ask ourselves if the times are ripe for such action. Otherwise we may find ourselves unsupported, and fail ignominiously. In the present instance the restrictions which have been put upon our foreign trade in live animals and meat products because of animal diseases, the total prohibition of such trade which is from time to time threatened because of unfounded rumors of disease which reach foreign governments, and finally the agitation for state inspection laws, have prepared the way, until even some of the large packers themselves are now asking for inspection. It certainly appears at present as if there would be little if any opposition to a national inspection law under which the healthfulness of the meats that go into interstate and foreign commerce could be guaranteed.

Such an inspection would also be of great value to the country because of the facilities it would give for discovering at an early period outbreaks of dangerous diseases among our meat-producing animals. It is impossible to maintain an inspection over any considerable portion of our country that is sufficiently thorough and frequent to guard against the introduction and spread of the worst forms of animal plagues. But with slaughter-house inspections at the great packing centres, no communicable disease could exist for any considerable period without being discovered. We see an example of this in the statement, recently made by the English authorities, that they have discovered contagious pleuro-pneumonia in steers which came from our Western states. According to the best information in the possession of our government, this disease does not exist in that section of the country. No doubt the English have found lesions which they attribute to that disease, and as they inspect a portion of our beef cattle at slaughter, and we inspect none, it is a difficult matter for us to contradict their statements, or to show that they are mistaken in their opinions.

There are, then, three very important reasons why we should have a careful inspection of our meat-producing animals at the time of slaughter:

1. To protect the health of our citizens.

2. To maintain the reputation of our meats in home and foreign markets.

3. To discover communicable diseases of animals before they have spread beyond easy control.

XXVIII.

SOME GENERAL REMARKS ON THE SUBJECT OF TEXAS FEVER.

By D. E. SALMON, D. V. M.,

Chief of the Bureau of Animal Industry, Washington, D. C.

[ABSTRACT.]

"There are some general resemblances in the peculiar characters of Texas fever in cattle and yellow-fever in men, which have led me to hope that the discovery of the cause of one of these diseases might throw some light upon the cause of the other. I think you cannot fail to be interested in having these resemblances briefly pointed out in connection with Dr. Smith's paper.

"In the first place, each of these diseases has a permanently infected and well known district in which it has its home,—yellow-fever in the West Indies and on the Gulf and South American coasts, and Texas fever in a broad belt stretching across our Southern states from the Atlantic to the Rio Grande. Yellow-fever is, I believe, indigenous to some parts of Africa, on which continent there is also a disease similar to, and probably identical with, Texas fever.

"Yellow-fever is believed not to be contagious from the sick, but the infection may be carried by well people in their baggage or about their persons, and the disease thus disseminated. Sick cattle do not communicate Texas fever, but the contagion is carried by healthy cattle from the permanently infected districts.

"People who live in yellow-fever districts have a certain degree of immunity from this disease, and are able to resist the influence of the infection when non-residents would contract it. Cattle native to the Texas fever belt seldom contract the disease, but Northern cattle taken to that section are almost invariably attacked.

"Both diseases, when carried north of their permanent home, require a period of warm weather for their development; and both are checked by cold weather, and particularly by frost. Neither contagion, beyond its permanent home, survives a winter with frost and snow.

"Both diseases are accompanied by disease of the liver, which causes more or less yellow coloration of the tissues, and in both diseases hematuria is seen, though I judge this to be much more frequent in Texas fever than in yellow-fever.

"These points of resemblance are certainly striking. They *may* indicate that the germs are somewhat of the same nature.

"I would not wish, however, to insist upon such a conclusion, nor do I care to go further than to mention the coincidences."

The speaker then, by a series of stereoptican views, showed the organisms as they appear in the red blood-corpuscles obtained from various organs of the body. The preparations had been made both before and after the death of the animal. The lantern-slides which were shown had not been retouched or manipulated in any way, but had been simply exposed and developed by the legitimate and well known photographic methods; and they showed very distinctly the objects which Dr. Smith described.

XXIX.

PRELIMINARY OBSERVATIONS ON THE MICRO-ORGANISM OF TEXAS FEVER.

By THEOBALD SMITH, M. D.,

Of the Bureau of Animal Industry, Washington, D. C.

Southern cattle fever, or Texas fever as it is more popularly known, is an infectious disease of the malarial type. The infectious agent, bound to a particular locality, is only temporarily transferred by cattle to places free from permanent infection. During the past summer healthy cattle, brought from North Carolina late in June, infected a small enclosed patch of pasture at the Experiment Station of the Bureau of Animal Industry. Of the native cattle placed in this enclosure at the same time, the first died late in August. Up to the last week in October, ten had succumbed to the fever, and two recovered. The territory, even after the Southern cattle had been removed, was still capable of infecting fresh animals placed upon it. There was also a continual increase or accumulation of the virus in the enclosure, for the animals placed on the ground late in the season died after an exposure of but one half or one third the period which was necessary to destroy those exposed since early summer. The infection did not spread beyond the enclosure.

The first indication that the disease had entered the system, and was there unfolding its destructive activity, was a continuous high temperature, fluctuating very slightly, and subsiding only when death or recovery ensued. The temperature rose from 101°–102° F., to 106°–107° F., and in the fatal cases remained high from four to fifteen days. After a variable number of days the high temperature was accompanied by general weakness, lasting but a few days, when death ensued. Had it not been for the thermometer, the early stages of the disease would have remained unnoticed.

A few days before death, the urine became more or less deeply tinged with hæmoglobin, and in nine out of ten cases the bladder, after death, contained deeply tinged urine. In the tenth case, hæmoglobinuria was present three days before death. The destruction of red globules causing this condition could be easily demonstrated by examining blood taken from an incision through the skin. In several cases, on the day before death,[1] the number of red globules had fallen to about one million in a cubic millimetre of blood, the normal being about five million. In one case, now recovered, the corpuscles were reduced in number nearly one half several days before the temperature fell to normal; and a week later the number had not yet risen to three million. This enormous loss of red globules gave the blood an exceedingly thin, watery appearance.

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[1] Several animals were killed in a dying condition.

At the autopsy, besides the condition of the blood as noted, it was found to coagulate rapidly, and form clots of unusual firmness. Large clots in the ventricles of one case, which had died during the night, cut like liver tissue. The following description of the most obvious lesions will apply with more or less emphasis to all ten cases:

The spleen is enlarged to several times its normal size. When incised, the tense capsule retracts, and discloses a dark red more or less disorganized pulp, occasionally running out as a semi-liquid mass. This engorgement is due chiefly to the presence of an enormous number of red globules. The liver is the seat of considerable disturbance. Its color is a yellowish-brown. The parenchyma is deeply bile-stained, and when examined under the microscope the finest bile canaliculi are found plugged in many cases with consistent, cylindrical masses of bile. We have, in fact, a complete pathological injection of the intra-lobular biliary system. The liver cells show more or less fatty degeneration. The bile in the gall bladder is usually so thick that it scarcely flows. This is due to the presence of a large amount of solids in the form of minute yellow flakes. There is no obstruction to the flow of bile into the duodenum. The kidneys are in some cases suffused with the color of hæmoglobin, and the connective tissue around them distended with reddish serum. In some cases they are but slightly affected. The small quantity of albumen found in the urine may be accounted for by the hæmoglobin.

Lesions of the fourth stomach and intestines were either absent, or else did not differ much in degree from those observed in healthy cattle. In one case there were superficial ulcers in the fourth stomach. A more or less extensive ecchymosis is occasionally met with in the duodenum, more rarely in the cæcum. In none of the ten cases examined was there any appreciable jaundice.

I am fully aware that these facts, in much greater detail than my experience or my time will allow me to present them, have been before the public since 1868. My reason for bringing them up again was to connect the observations on the etiology to follow with certain definite characters of a definite outbreak, so that there may be no question raised in the future as to the nature of the disease from which the following facts were derived.

In investigations of this nature it is very desirable that all theories which may account for the disease process should be carefully tested. But the quantity of work to be done, if all are to be exploited at the same time, is so great that the work probably would end in a muddle. To the student of Texas fever several theories clamor for attention. First, it would not be out of place to do as some observers have done, and locate the cause of the disease in the organ most affected, such as the liver, and refer the destruction of the blood elements to the reabsorption of bile from that organ. This theory, however, does not seem tenable, because the visible sign of the reabsorption of bile,—jaundice,—is not constant in Texas fever, and did not appear at all in the cases upon which our investigations are based.

If we make the destruction of the red corpuscles the starting-point of our theory, we have two alternatives before us. The specific germ may multiply in the digestive tract, and thus produce a ptomaine capable of dissolving red corpuscles when absorbed into the circulation. Those who are acquainted with the researches of Stadelmann and more particularly Afanassiew in Germany will see the pertinence of this theory. These observers produced in dogs nearly all the lesions which I have mentioned as characteristic of Texas fever by feeding varying doses of toluylenediamine. The absorption of this poison caused rapid destruction of the red corpuscles, followed by the injection of the bile canaliculi with thick bile, jaundice, and hæmoglobinuria. The other alternative would assume that the red corpuscles are destroyed by organisms in the blood itself. It will be seen on a little reflection that to test the truth or falsity of these hypotheses would require diverging lines of research, especially when we bear in mind that there may be disease-germs which can only be detected with the microscope.

In order to understand the results obtained from the investigations conducted in the laboratory of the Bureau of Animal Industry, it will be best to give a brief summary of the latter. In the summer of 1886, two spleens taken from animals which had died of Texas fever in Virginia came to the laboratory. Cultures from one gave a variety of bacteria. From the other, all media remained sterile. At the same time the following observations were recorded:

In or on many red corpuscles there are small round bodies, perhaps 1 μ in diameter, centrally or somewhat excentrically situated, which stain poorly in an aqueous solution of methyl-violet, very well in aniline-water methyl-violet. They then resemble micrococci in size and form. Unstained, they can be seen as mere transparent spaces in the corpuscles.

No opportunities were presented for the further study of the disease within reach of the laboratory until the summer of 1888. An outbreak in Maryland, perhaps fifty miles from Washington, furnished the material. Five cases were found in a condition fit for study, and various organs were taken to the laboratory in refrigerator cans designed especially for such a purpose.

From these numerous cultures were made on different substrata, while the organisms of the intestinal tract likewise received due attention. In general, cultures from the spleen, kidneys, and urine remained sterile. From the digestive tract were obtained almost pure roll and plate cultures of a microbe probably identical with Escherich's *bacterium coli commune*. This organism was occasionally present in the liver and bile, and very rarely penetrated into other organs in very small numbers.

During the outbreak studied this summer, my time and attention were diverted into another channel. Cultures were made, however, from at least five cases upon such substrata as blood serum, agar, glycerine agar, and bouillon peptone, with the same negative result. While cultivation demonstrated the absence of bacteria from the blood and internal organs, the microscopic examination was equally fruitless.

The negative outcome of bacteriological work in 1888, combined with a careful study of the pathological changes in the organs which came to the laboratory at that time, led to the inference that the disease must be due to a blood parasite which could only be detected by the microscope. It thus became essential to have the disease within reach of a laboratory so that the blood could be carefully studied during the course of the disease, and the material from the internal organs be absolutely fresh. These conditions were fulfilled in an admirable manner, as you have seen; and the outcome has been the discovery of what we believe to be an organism within the red corpuscles of the blood. The intra-globular bodies observed in 1886 were found in all of the ten fatal cases of Texas fever. It might be asked, Why was the organism not found in 1888? I would reply, that, owing to the condition of the material, I could place no reliance upon studies of the blood elements, which, even under the best conditions, are very difficult. Hence no attention was paid to this subject, and the time was devoted to bacteriological studies. In these days it is necessary, first, to demonstrate the absence of bacteria before other results are credited. I may say, however, that preparations from one of last year's cases, reëxamined a few days ago, showed the intra-globular bodies as distinctly as could be desired, but in numbers too small to be detected by any but the forewarned. The observations thus far made upon the intra-globular bodies may be very briefly summarized.

In fresh spleen pulp they are visible as round or oval, nearly colorless spots, from ½ to 2 μ in diameter on the disc of the red corpuscles, and always somewhat excentrically placed. Careful focusing leaves no doubt that they are within the body of the corpuscle. There may be but one, quite commonly two, and very rarely three or four, in the same corpuscle. In organs kept in the cold for nearly two weeks they were still visible, but faintly, owing to the diffusion of the hæmoglobin around and perhaps into them.

When cover-glass preparations are dried, heated, and stained with the ordinary aniline dyes, these intra-globular bodies stain as readily as nuclei and bacteria, and hold the stain with a similar tenacity.

The smallest forms then appear like deeply stained cocci, about ½ to 1 μ in diameter, situated within the unstained circle of the corpuscle. Occasionally the bodies are nearer 2 μ in diameter, and then the staining may be less dense. Besides the spherical forms, ovoid forms are not uncommon. These usually occur in pairs within the same red corpuscle. A still rarer, pear-shaped form is encountered in stained preparations of the blood. It is rounded at one pole, while the other is pointed and sometimes drawn out as a short filament. These forms quite invariably occurred in pairs, a corpuscle being occupied by a single pair. I am very much inclined to consider the pair as the result of a division of the single body within the globule. In one instance I saw the tapering ends of a pair apparently continuous. Each body was about 3 μ long, its greatest width 1.5 μ. These are the largest I have encountered. This same pear-shaped form I have only seen in cover-glass preparations made from blood during life.

That these parasites have the power of changing their form I cannot affirm from direct observation. The following illustration seems to indicate that they may. In one of the attacked animals the disease ran a very brief acute course. It was killed when the rapidly falling temperature and the inability of the animal to rise indicated death before next morning. The spleen and liver were flooded with the intra-globular bodies. Perhaps every fifth corpuscle contained a pair. Cover-glass preparations, dried at the autopsy, showed the ovoid bodies very well. The kidney, for want of time, was placed in the cold. Twelve days later it was still in good preservation. Preparations made at that time showed a large number of intra-globular bodies in pairs, but round. It is highly probably that they changed their form in the cold.

One other abnormal form found in the blood deserves mention. When dried cover-glass preparations are stained in Loeffler's alkaline methylene blue, a few red corpuscles appeared as if their surface had been dusted over with minute specks of coloring matter. Whether they are due to the anæmia, or whether they belong to the cycle of the parasite, remains to be determined experimentally.

As to the relative number of intra-globular bodies in the different organs of the same animal, the ten cases which have come under observation afford some noteworthy facts.

As a rule, there are very few in the circulating blood, whether taken from incisions through the skin before or during the death agony, or from the heart after death. There are exceptions to this rule, however. In one case they were readily detected in blood from a skin incision one day before the animal was killed. Blood from the right ventricle showed an enormous number of these bodies in pairs within the red globules.

As a rule, then, the circulating blood contains comparatively few parasites. They are filtered out by the spleen and the liver. They may be very numerous in one or both of these organs, and practically absent in blood from the right ventricle. They are somewhat more numerous in the spleen than in the liver. This estimate may, however, be erroneous, owing to the larger number of blood corpuscles in the spleen pulp. I paid but little attention to the blood in the kidney. In two cases in which a very large number of parasites were found in spleen and liver, they were likewise very abundant in the kidneys. The red marrow of the ribs examined in four cases contained none.

There are also a few facts at hand concerning the relative number of parasites in different animals at the time of death. In perhaps one half of the cases they were so few in number in the spleen that they might have easily escaped the attention of an observer casting about for bacteria. In four out of ten cases the organisms were very numerous in spleen and liver, and could not well be overlooked. I found myself able to see them in a thin layer of fresh spleen pulp, with a dry apochromatic objective, giving a magnification of not more than two hundred and fifty diameters. In one case they were so few in number, even in spleen pulp, that a number of fields had to be scanned before any were detected. In this case the spleen was completely disintegrated. The urine containing much hæmoglobin several days before death was found almost of normal color at the autopsy. The animal had evidently overpowered the parasites, but died from the havoc caused by them.

Concerning the transmission of the disease from cattle to other animals, we have only the following experiment to report: Spleen pulp from a steer just killed, and containing very many intra-globular bodies, was stirred up in sterile salt solution, and of this red liquid one and one half cubic centimetre was injected into the ear-vein of each of three rabbits. They remained perfectly well.

The question now arises, What is this organism? We have seen it in but two recognizable forms,—the sphere of slightly varying diameter, and the oval, pear-like form. I have already said that I believe these to be one and the same form, the latter a stage of division. This may or may not be true. The difficulties surrounding the direct observation of these minute bodies are very great, and we may have to rely upon indirect methods for more information. It might be argued that they belong to embryonic or degenerated red corpuscles. That they do not belong to embryonic forms I have been able to convince myself by examining the red marrow of the ribs, where the production of red corpuscles to take the place of the destroyed ones is very active. That they are not elements of degenerated corpuscles is too evident from what has been stated to require further discussion.

As to the true nature of the organism, only conjectures are possible at this stage of the inquiry. It may be a phase in the life history of some of the lowest mycetozoa, such as the monadineæ, or it may belong to the group of sporozoa, some of which (coccidia) are pronounced cell parasites. As to the external characters of the disease, we have still to learn how Southern cattle carry the disease germs while they themselves are immune, how the germs multiply on the pasture, and how they enter the susceptible organism of Northern cattle, and whether or not they are ever eliminated from the diseased body to become a fresh centre of infection. These problems are intimately associated with the life history of the parasite, and will finally be solved when its life is thoroughly known. They are the most important from an economic stand-point, and their solution will, without doubt, throw a strong light on human malarial diseases.

I think that we may safely formulate a simple definition of this disease with the aid of the foregoing observations. It is essentially a blood disease. There is a continuous or paroxysmal destruction of red blood corpuscles due to an intra-globular parasite, and the disease results mainly from the incapacity of the internal organs, primarily the liver, secondarily the spleen and kidneys, to transform and remove the waste products resulting from such destruction. In milder cases the protracted anæmia, which results from the loss of corpuscles, may become the chief cause of exhaustion and death, even when the organs remain pervious and capable of carrying on their respective functions.

I have purposely omitted in this brief sketch to refer to former investigations of Texas fever. I need simply to say that so far as my own have been carried, they contradict the results of those who claim to have found germs which can be readily cultivated. Their claims are just, so far as the finding of germs is concerned, but I do not doubt that they all have a *post-mortem* history, and that the investigators have been hampered by difficulties which it was impossible to overcome. There seems to be nothing which literally breeds bacteria so rapidly as the dead body of an animal in midsummer.

In conclusion, I wish simply to mention a few facts already on record, bearing directly upon what has been claimed in this paper. In glancing over the very excellent report of Dr. Stiles to the New York State Board of Health in 1867, I find the following statement:

> "The red blood corpuscles, when examined immediately after removal from the body, were shrivelled and crenated without artificial provocation. In one case many of the discs appeared to have lost a portion of their substance, as if a circular piece had been punched out, the addition of water failing to restore the disc to completeness."

I am convinced that Dr. Stiles had before him the intra-globular bodies, which must have been very abundant and characteristic to call forth this statement. His description applies exactly to the appearance which was presented by these bodies in a few cases, more particularly when the bodies were relatively large. At that stage of our knowledge it was entirely excusable for Dr. Stiles to pass these bodies by without further attention.

In Virchow's Archiv. for January, 1889, V. Babès describes an enzoötic disease among Rumanian cattle, along the banks of the Danube, which he calls epizoötic (*seuchenhafte*) hæmoglobinuria. The disease has many features in common with Texas fever, and many peculiar to itself. Towards the end of his investigations, made in the summer of 1888, Babès settled upon an intra-globular parasite as the probable cause of the disease. This he also found in masses outside of the blood corpuscles in the œdematous hæmorrhagic infiltrations about the kidneys, stomach, and intestines. He describes it as a diplococcus, is able to cultivate it, and produces in rabbits by subcutaneous injection a disease fatal in from one and a half to two weeks. Without going into detail, I am inclined to consider this parasite as described by him quite different from the one found in Texas fever. The Texas fever organism has thus far failed to multiply in culture media. Its appearance did at no time suggest the characters of bacteria. It has not been found outside of blood-corpuscles in any appreciable numbers. Inasmuch as both his and our investigations must be regarded as just begun, the future will have to decide how near of kin these two diseases are.

These investigations, taken together with those on malaria, make the prediction not at all improbable that a similar class of parasites will ultimately be found associated with all strictly miasmatic diseases.

XXX.

SANITARY ENTOMBMENT: THE IDEAL DISPOSITION OF THE DEAD.

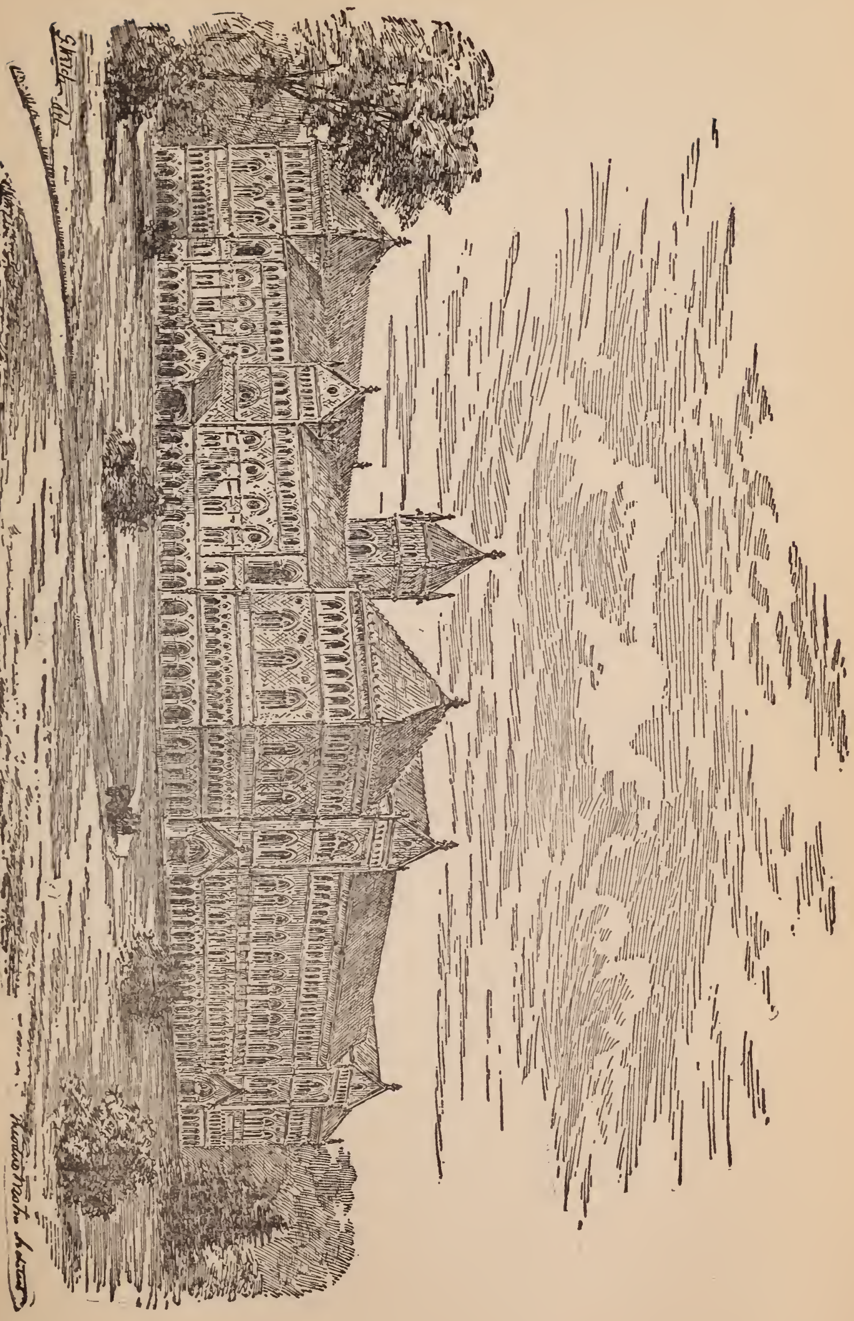
By REV. CHARLES R. TREAT, of New York.

It is a strange thing that the time should have come to attack the church-yard in its use for the burial of the dead; but it is really far more strange that the church-yard should have come to be one of man's most deadly foes. This, however, every thoughtful man will now have to admit to be true; and this will make easy what otherwise would have been impossible for a tender or reverent mind.

As a general statement, it will suffice to quote the words with which Lord Beaconsfield denounced the church-yard, in the House of Lords, in 1880: "What is called 'God's acre' is not adapted to the times in which we live or to the spirit of the age. The grave-yard is an institution prejudicial to the public health; and the health of the people ought to be one of the considerations of a statesman. The time has arrived when a safer disposition of the dead should be instituted."

In view of such a statement, and of many more that come readily to mind that have been made in stronger terms, and most of all in view of the fact that the agitation against the church-yard has been maintained for more than a hundred years, it is amazing that this use should die so hard; and as we survey the past, it will amaze us more to be compelled to confess that the church-yard has been made man's foe by civilized and Christian men! The story of this use of consecrated ground is so short, that, although familiar, it may well be told again.

In the early Christian centuries, as in the centuries preceding, among men of all religious beliefs and practices, the conviction, both instinctive and founded on experience, prevailed, that the dead should not be brought into proximity with the living. Accordingly the practice, definitely demanded by the "Twelve Tables," became universal not to bury within a "city" or any group of human habitations. The first step in the wrong direction seems to have been taken at the dying request of the first Christian emperor, who was interred at the entrance of the Church of the Holy Apostles, in Constantinople. The tendency, however, to follow this example, and to secure similar interment in holy earth, was stubbornly resisted; and it was not until the latter part of the sixth century that burials were permitted within towns or cities, and it was not until the eleventh century that burials were permitted in churches. From this time the custom continued without notable interference until

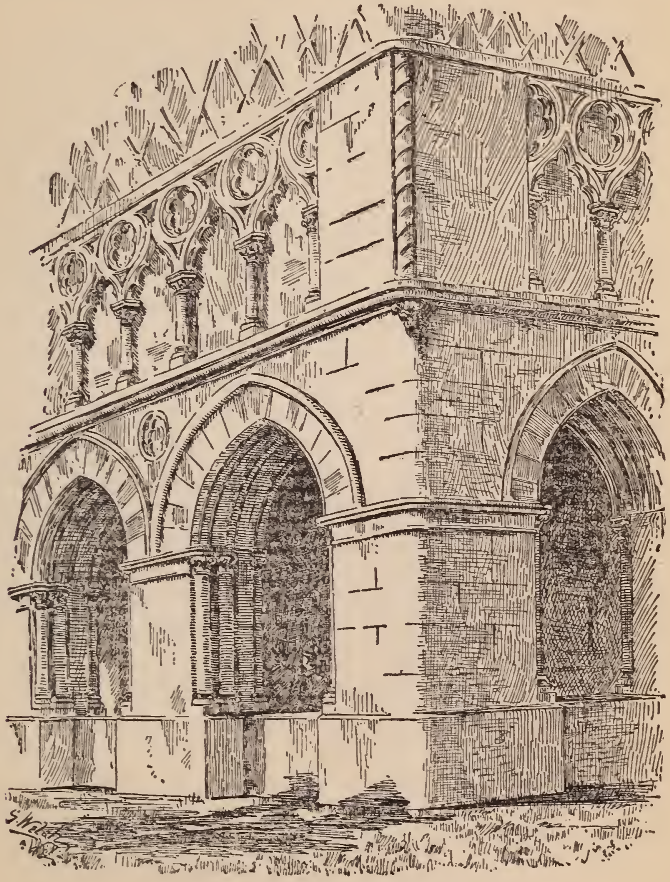


"CAMPO SANTO" FOR NEW YORK.

the latter part of the last century. Then, in that era of tremendous change, the church-yard did not escape. In Paris, the church-yard of the Church of the Holy Innocents was first condemned in the interest of the public health, because much sickness had been traced to the foul stenches that rose therefrom; and it is worthy of special notice, as indicating the extent of the danger, that M. Thouret, the official charged with the duty of disinterring the dead, was overcome by the foul air that he was compelled to breathe, and barely escaped with his life from a putrid fever that he there contracted. A little later the grounds about the churches of St. Germain des Pres and St. Eustache were also barred from burial, and the contents of their graves were carried to the quarries that have since become the "Catacombs" of Paris. In Austria, under Joseph II, the ruler of such unhappy methods but of such noble aims and advanced ideas, the burial of the dead, within or near to churches, was prohibited by law; and this was such an honest enactment that neither rank nor wealth could evade it.

In England, unhappily, the progress of this reform was not so rapid. Bishop Latimer had soundly said, in a discourse upon the restoration to life of the widow's son at Nain,—"The citizens of Nain hadd their buryinge-place withoute the citie, which no doubt is a laudable thinge. And I do marvel that London, being soe great a citie, hath not a burial-place withoute. For no doubte it is an unwholesome thinge to bury within the citie, especiallie at such time when there be great sicknesses and many die together. I think verilie that many taketh his death in St. Paul's church-yard. And this I speak of experience, for I myself, when I have been there some mornings to heare the sermons, have felt such an unwholesome and ill-favoured savour, that I was the worse for it a while after, and I think no lesse but it is the occasion of great sicknesses and disease." And it is deserving of mention that Sir Christopher Wren entreated the citizens of London, in rebuilding the city after the great fire of 1666, to put an end to the pernicious practice of burying within their churches and about them, and even within the limits of their city. But these appeals, and many more that were more urgent and more recent, were vain; and it was not until nearly the middle of our proud century that England would listen to the reformer of this crying evil.

In this country, partly because there were few places of large population, and partly because it was an early and general tendency to use cemeteries rather than churches and the grounds adjacent to them, the evils of earth-burial did not manifest themselves so soon or in so marked a manner as in the Old World. But there were instances enough to convince the most incredulous that a radical change must be made. Dr. Ackerly, writing in 1822, thus describes the condition of the burial-ground connected with Trinity church, New York, forty years before: "During the Revolutionary War this ground emitted pestilential vapors, the recollection of which is not obliterated from the memory of a number of living witnesses." In the same year the *Commercial Advertiser* published an article in reference to the present evils of earth-burial at the same place, in which it was said,—"It will be remembered that the grave-yard, being above the streets on the west and encompassed by a massive stone wall, and the east side being on a level with Broadway, it results that this body of earth, the surface of which has no declivity to carry off the rain, thus becomes a great reservoir of contaminating fluids suspended above the adjacent streets. In proof of this, it is stated that, in a house in Thames street, springs of water pouring in from that ground occasioned the removal of the tenants on account of their exceeding fetidness." At a later date, Dr. Elisha Harris brought this telling indictment against the same place of interment: "Trinity church-yard has been the centre of a very fatal prevalence of cholera, whenever the disease has occurred as an endemic near or within a quarter of a mile of it. Trinity Place west of it, Rector street on its border, the streets west of Rector, and the occupants of the neighboring offices and commercial houses have suffered severely at each visitation of the pest, from 1832 to 1854." It seems hardly necessary to add that the foregoing statements



"CAMPO SANTO" AMBULATORY.

are not intended to make the impression that there was a worse condition at the church-yard named than at any other. The truth is, that this only illustrates what was universal throughout the city; and, in proof, it may be cited, among the unsavory recollections of the time, that the sexton of the "Brick church," Beekman street, was accustomed to caution the persons standing near, when a body was to be deposited in the vaults, saying, "Stand on one side. You are not accustomed to such smells!" And the sexton of the Dutch church, close by, was known to have said that, when going down into the vaults, the candles lost their lustre, and that the air was "so sour and pungent that it stung his nose." Naturally, therefore, it was noted in the public press: "This being the case with all the vaults where dead bodies are deposited and subject to be opened at all seasons, this method of disposing of the remains of our friends is at the least an unpleasant and certainly a dangerous one." And the result was to be expected, that the board of health should utter their official protest against the continuance of the perilous practice, as they did in 1806: "Interment of dead bodies within the city ought to be prohibited. A vast mass of decaying animal matter, produced by the superstition of interring dead bodies near the churches, and which has been accumulating for a long time, is now deposited in many of the most populous parts of the city. It is impossible that such a quantity of animal remains, even if placed at the greatest depth of interment commonly practised, should continue to be inoffensive or safe."

It may now be said,—Yes, this is all true, but we have changed all that! We no longer inter our dead in church-yards or burial-grounds within the limits of cities. We have provided cemeteries at great distances from our cities and large centres of population, and there the dead can do no harm.

To this the reply is easy and convincing,—that, if the dead endanger the living when the population is dense, they certainly also endanger them when the population is sparse. The danger is only diluted. It still exists, and it ought to alarm us just as truly when a few are imperilled as when many are. As lovers of our kind, as claiming to be humane, we can no more be indifferent to the danger of a few than to the danger of the many. True philanthropy has no sliding scale by which to gauge her gifts. And if the evils of earth-burial issue from the fact that a lifeless body is buried in the earth, then these are not escaped and cannot be, unless the dead are buried at such a distance from the living that the living can never come in contact with the earth in which they lie, or breathe the air or drink the water which they pollute. Therefore, the question as to the effect upon human health of our cemeteries can be considered settled in the case of all that are not remote from the habitations or the approach of men; and such cemeteries, as we know, are few, and they are not the cemeteries which lie upon the borders of our great cities.

To strengthen this general position, it will be sufficient to quote the familiar but weighty assertion of Sir Henry Thompson: "No dead body is ever placed in the soil without polluting the earth, the air, and the water above it and about it;" and the testimony of Dr. Holland, who speaks as the opponent of this reform and the antagonist of Sir Henry Thompson, that the best situated cemeteries may be so mismanaged as to become unsafe, that cemeteries should not be too near dwellings, that they should not be over-crowded, that the soakage from them should be carefully guarded against, and that wells near burial-grounds are unfit sources of drinking-water; and the declaration of the French Academy of Medicine, that the cemeteries of Père-la-Chaise, Montmartre, and Montparnasse, once suburban, now intramural, are the cause of serious disorders of the head and throat and lungs, that result in the loss of many lives; and to note the experience of Brooklyn, half girdled with graves, of which the editor of the *Sanitarian* does not hesitate to assert,—"Typhoid fever is, taking one year with another, increasingly prevalent in Brooklyn, and it is, in our judgment, probably due for the most part

"CAMPO SANTO," CLOISTER AND GLIMPSE OF COURT.

to sewage pollution of the intensest and most loathsome kind—the seepage of grave-yards!"

Thus far this subject has been treated as though the only evil influence that a decomposing body could exert would be through the poisonous character of the resultant compounds. Unhappily, the story is only partly told; and greater dangers remain to be revealed.

Within a few years it has become unquestioned that some of the deadliest diseases that attack mankind owe their origin and propagation to living organisms, and it may yet appear that the field of their operation is far wider than we now think. Not to attempt to tell all that has been ascertained, it will be sufficiently convincing to quote from Sir Henry Thompson's utterance in the *Nineteenth Century*, in 1880: "I state, as a fact of the highest importance, that by burial in earth we effectively provide—whatever sanitary precautions are taken by ventilation and drainage, whatever disinfection is applied after contagion has occurred—that the pestilential germs, which have destroyed the body in question, are thus so treasured and protected as to propagate and multiply, ready to reäppear and work like ruin hereafter for others. . . . Beside anthrax, or splenic fever, spores from which are notoriously brought to the surface from buried animals below and become fatal to the herds feeding there, it is now almost certain that malarious diseases, notably Roman fever and even tetanus, are due to bacteria, which flourish in the soil itself. The poisons of scarlet-fever, enteric fever (typhoid), small-pox, diphtheria, and malignant cholera are undoubtedly transmissible through earth from the buried body." That the burial of a body which contains the seeds of zymotic disease is simply storing them for future reproduction and destruction, is amply proven by the researches of Darwin and Pasteur, of whom the former has shown that the mould, or fertile upper layer of superficial soil, has largely acquired its character by its passage through the digestive tract of earth-worms; and the latter, that this mould, when brought by this agency to the surface from subjacent soil that has been used as a grave, contains the specific germ of the disease that has destroyed its tenant.

We may fitly close this portion of the discussion with the conclusion, so strongly stated by Dr. James M. Kellar in his report to the session of the American Public Health Association at St. Louis in 1884, which is far from an over-statement of the truth: "We believe that the horrid practice of earth-burial does more to propagate the germs of disease and death, and to spread desolation and pestilence over the human race, than all man's ingenuity and ignorance in every other custom."

It may now be asked, Granting that these evils are inseparable from the burial of the dead in the earth or in tombs, what is the remedy? What else can be done?

To this question not many answers can be given, because the modes of disposing of the dead have always been and must always be few.

Plainly, no such novel mode as casting the dead into the sea will be generally adopted. Plainly, also, the mode of the Parsees, grounded as it is in ancient, if not original, use—to give the dead to beasts and birds—will not become universal. And plainly, also, cremation will not be welcome to the many, free as it is from objection on the score of public health, if a method equally sanitary, and at the same time satisfactory to a reverent and tender sentiment, can be devised.

The inquiry, then, has reached its limit. For, apart from the modes that have just been named, there are no others but earth-burial and entombment; and earth-burial, as we have seen, cannot be made sanitary under common conditions. Therefore, if the demands of affection and sanitation are both to be met, entombment is to do it, or it cannot be done.

"Campo Santo," Angle of Cloister.

Happily, better than any other method of disposing of the dead that has ever been devised, entombment has met the demand of affection. Never has any other mode so commended itself to men as this. There may have been at times a general adoption of cremation, and there may have been a general prevalence of earth-burial; but the one has not long satisfied the sorrowing survivors, and the other has owed its beginning and continuance to the apparent absence of alternative. Wherever the living have been able, and the dead have been dearly loved or highly esteemed, the tendency to entomb and not to bury has been constantly manifested.

To call attention to this tendency is enough to prove it, so easily accessible is the evidence and so familiar is its operation in the human heart. The most natural reference will be, first, to the Mausoleum, the tomb of Mausolus, that was erected by his sorrowing queen, Artemisia, at Halicarnassus, upon the Ægean's eastern shore; and that became at once one of the few great wonders of the ancient world. This was intended to do honor to the loved and illustrious dead; and this it did, as no grave or pyre could do. This was also intended to protect the lifeless form from ruthless robbery and reckless profanation; and it performed this task so well, that for near two thousand years no human eye beheld the mortal part of Mausolus, and no human hand disturbed its rest. At a far earlier time, Abraham, the Father of the Faithful, while he illustrated this tendency to entomb the dead, also offered an influential example to all who would do him reverence, as, in the hour of his great sorrow, he sought the seclusion and the security of Machpelah's cave for the last earthly resting-place of his beloved wife. There he buried Sarah; there he and his son and his son's son and their wives were all laid to rest, and the place of their repose hath not been violated even at this distant day. To this constant tendency, constant testimony is borne by the massive and magnificent tombs in which India abounds, the tombs and pyramids that make marvellous the land of the Nile, the tombs that stood thick upon the Appian Way and that rose superb upon the Tiber's shore, the modern use to which the Pantheon is put, the Pantheon at Paris and the Crypt of the Invalides, the Abbey of Westminster, matchless in memorials, the sepulchres within the hills that gird Jerusalem, and the sepulchre in which the Nazarene was gently laid when his agony was ended.

It remains to consider whether entombment can be made sanitary: if it can be, the problem is solved, for entombment has ever been the best that the living could do for their dead; and, with the added advantage of promoting, or ceasing to be prejudicial to, the public health, entombment will be the choice of all whom cost or caprice does not deter.

That entombment can be made sanitary is evident from the fact that, in countless instances, in many lands and through long periods of time, it has been made sanitary by the ingenuity of man or by unassisted nature; and it is also evident from the fact that decomposition and disease germs are the dangers to be guarded against, and that against these both ancient and modern science have been able to guard. Not to enumerate all the modes that have been chanced upon or that have been devised by men, there are two that have been notable, and are available for modern use—embalming and desiccation.

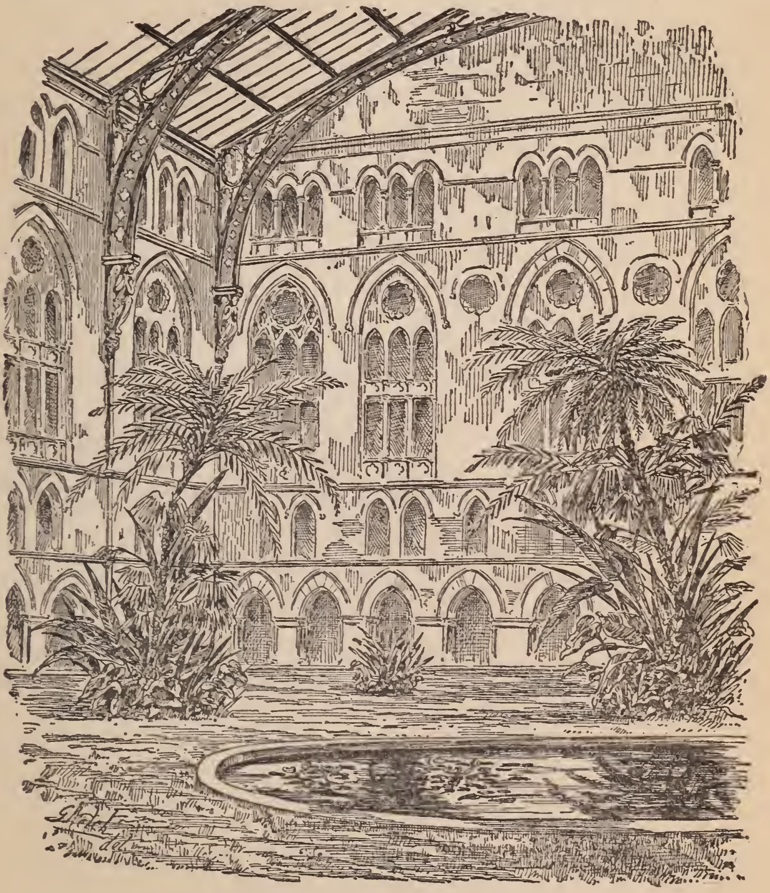
It is a delusion to imagine that embalming is a lost art; that, like some other marvels of the ancient time, this is a secret process that perished with the people that employed it. Did we desire it, we could embalm our princes and our priests, and retain their shrunken similitudes for distant coming times to gaze and gape upon, as skilfully as they who practised this art in Egypt's palmiest days. Nay, it is doubtless far within the truth to claim that better than they did we could do; and we are actually apprised of better methods and results than they employed or could attain, and it is not unlikely that we shall hear of better methods still. But Egypt's method, or its modern counterpart, will hardly now be popular. It involves too much mutilation and too much transformation. When it has done its work, little is left but bone and muscular tissue, and these are so transfused with foreign substances, that a form molded from plastic matter or sculptured from stone could almost as truly be considered that of the lamented dead, as this. Moreover, indefinite preservation of the dead is not desirable, and is not desired. The uses to which the Egyptian Pharaohs and their humbler

"Campo Santo," Family Compartment.

subjects have been put in these days of indelicacy and unscrupulousness in the pursuit of science or sordid gain, are not such as to make many eager to be preserved for a similar disposition, when the present shall have become a similarly distant past.

Desiccation, in striking contrast with embalming, is the process of nature rather than of art; and involves no mutilation and no substitution of foreign substances for human flesh; and does not by unnatural means preserve the semblance of the human form so long that a susceptible sentiment is shocked and a due return of material humanity to the elements that gave it birth prevented. Desiccation is so far a natural process, that it seems not to have been thought of, until nature had done the work and shown the product; and through many centuries and upon an extensive scale nature had employed the process before it occurred to man to copy her, and adopt her method for the disposition of his dead.

Wherever the air that enwrapped the lifeless form of man or beast was dry, disiccation anticipated and prevented decomposition. In deserts, upon elevated plains, upon the slopes of lofty mountain ranges, to which the winds that passed their summits bore no moisture, the dead have not decayed, but have dried undecomposed. In the morgue attached to the Hospice of St. Bernard, the dead, lifted too late from their shroud of snow, and borne thither to await the recognition of the friends, dry and do not decay. In the "Catacombs" of the monastery of the Capuchins at Palermo, and in the "Bleikeller" at Bremen, the same phenomenon has appeared. Even Egypt is a confirmation of these statements, for it is probable that, had much less care been taken to preserve the dead, they would not there have yielded to decay as in other lands, and that moisture is so far absent from the atmosphere that the dead would have been preserved from decay by disiccation had not embalming been resorted to. Upon the elevated western plains of this continent, the bodies of beasts and of men, by thousands, have been preserved from decomposition by desiccation. To take one instance out of many that might be cited: A cave was not long ago discovered high up among the Sierre Madre Mountains, within which were found, where they had rested undisturbed for many years, the lifeless figures of a little aboriginal household, dried and undecayed. Father, mother, son, and daughter, one by one, as death had overtaken them, had been brought thither, bound so as to keep in death the attitude that had marked them when at their rest in life, and there they bore their silent but impressive witness to the beneficent action of the unmoist air that had stayed decay and kept them innocuous to the living that survived them. In Peru, instances of this simple, wholesome process abound on almost every side: upon the elevated plains and heights, as also beside the sea, the dead of Inca lineage, with the lowliest of their subjects, are found in uncounted numbers, testifying that in their death they did not injure the living, because desiccation saved them from decomposition; and a recent traveller has vividly described the scene that a battlefield of the late war presents, and that illustrates the same process, where, though years have passed since the last harsh sound of strife was heard, the fierce and bitter combatants still seem eager to rush to conflict, or to sink reluctant into the embrace of death. And all these instances furnish conclusive proof that decomposition can be controlled, and that its loathsome and unwholesome transformations can be prevented, if only the simple conditions are secured that have already so extensively effected this result. That these conditions can be secured no one can doubt; for, every day, in almost every clime, by processes familiar and available to man, the atmosphere has moisture added to it or taken from it; and the extraction of the moisture from a portion of the atmosphere is all that is required to introduce the process of Peruvian desiccation into the sepulchres of Chicago or New York.



"Campo Santo," Inner Court.

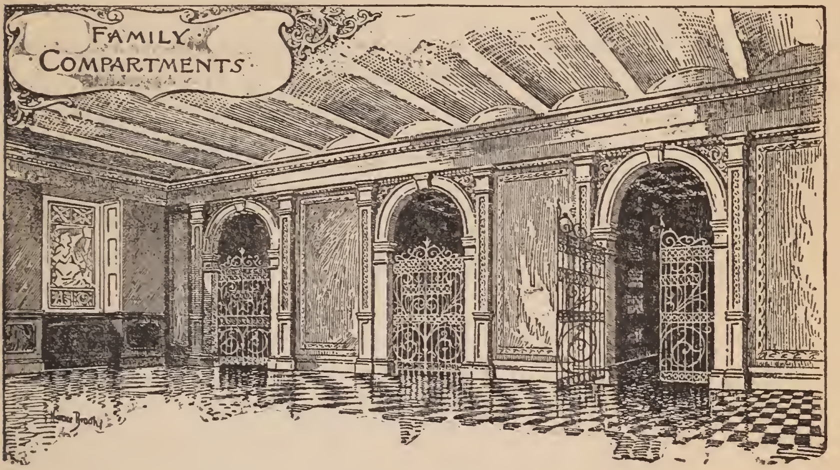
It will naturally be further asked, Is this all that has been done to demonstrate the efficiency and availability of desiccation for the dead? To this the answer would be sufficient, that the evidence that has been adduced is ample; and that, at once, in perfect confidence as to the result, mausoleums might be erected, with provision for the withdrawal of the moisture from the atmosphere, and for the passage of the desiccated air through the sepulchres in which the dead should rest. So little is involved, and so much has been accomplished without the application of any human skill, that it seems inevitable that as soon as the resources of modern architecture and sanitary science are drawn upon, the desired result will be at once attained. But to make assurance doubly sure, several carefully conducted experiments have been made, under the supervision of the directors of the New Mausoleum movement, that prove that the conditions of desiccation can be controlled, and that decomposition can be prevented; that where it has begun it can be stayed, and that prolonged preservation, with a fair approximation to the appearance in life, can be made sure, for the recognition of absent friends, for transportation, or for the furtherance of the ends of justice.

When, now, it is added, that desiccation has been ascertained to be an efficient agent in the destruction of disease germs, as proved by the experiments of Dr. Sternberg of the Hoagland Laboratory, and by the investigations of other experts, enough seems to have been said to establish the truth of the assertion that entombment can be made sanitary, and that, therefore, entombment offers the satisfactory solution of the problem how to dispose of the dead so as to do no violence to a reverent and tender sentiment, and at the same time not to imperil the public health.

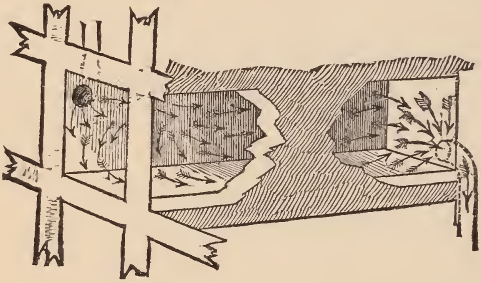
The proposition, then, soon to be submitted for public approval is this,—to erect in the suburbs of our large towns and cities, perhaps even in their most thickly populated parts, extensive and handsome edifices that will provide sanitary sepulchres for the dead. To be comparatively inexpensive, they will have to be comparatively plain; and it seems not too much to hope that our cities will soon adopt this mode of disposing of the dead that depend upon the public care for burial, and that the horrors of a "Potter's Field," of which it cannot be divested even in a fair and sea-girt isle, may be forevermore unknown of men.

All these structures, however, will not need to be inexpensive and plain. Many of them, as the rich shall lavish their wealth upon them, will be spacious and splendid, as no tombs of earlier time have ever been. These will naturally differ in design and plan, and while one will incline to one order of architecture, another will incline to another;—one will incline to the light and graceful style of the Greeks, another to the substantial and enduring Roman type, another to the still more firmly-built and time-defying type of the Egyptians, another to the rich and exquisitely decorative Byzantine style, and another to the Gothic type, with its suggestions of spiritual aspiration and heaven-sent consolation and heaven-born peace. It should certainly be the architect's study to avoid, as either of these styles is adopted, the appearance of edifices with familiar and established secular or sacred uses. These must, if possible, be so designed as to speak of repose and loving care and undying recollection, and should appear to be homes for the dead, and yet temporary habitations in which they only rest until the resurrection.

Perhaps the most favored style will be that of the "Campo Santo," like that at Pisa, where the Holy Field lies light upon the dead, and where the softened sunshine and the tempered wind and the hushed notes of happy birds and the sweet seclusion of the spacious and graceful Gothic cloister, with its memorials of many who have been loved and lamented, and its rare pictorial teaching of the life to come, all speak soothingly of hope and peace and comfort. Such a "Campo Santo," modified to meet the demands of modern life and art, might well be one of the crowning monuments even of this wondrously achieving age. To what a grand and noble consummation would it seem to lead the race in their efforts for a fitting disposition of their dead! And what honor would it reflect upon the men who should erect it and place it at the command of their fellows, in due regard for what both health and heart require!



Within, there would be, as the unit of construction, each sepulchre so constructed that anhydrous air could enter, or would be made to enter, and withdraw, laden with moisture and morbific matter, which it would convey to a separate structure, where a furnace would complete the sanitary work that the anhydrous air had begun, and return to the external atmosphere nothing that would be noxious. Each sepulchre, in itself and its surroundings, would appear to provide a place of repose, and would have electrical appliances attached to it for the instant indication of the return of consciousness to any who had been prematurely entombed; and would promise and provide the most perfect and permanent protection against intrusion or theft that can be found on earth. In arrangement, these sepulchres would have to conform to the price paid and to the taste of the purchaser. Many would be like the single graves that thickly ridge portions of our cemeteries; many more would be grouped together after the semblance of a family tomb, as in the illustration; but in the general impression, in the surroundings and suggestions, the resemblance to the provisions of a cemetery would go no farther. For here there could be no burning sun, no chilling cold, no inclement storm; for the living, as they should pay the last sad honor to the dead, or in any subsequent tribute of affection, there could be no exposure, and for the dead there would be only the constant semblance of the comfort and the quiet of the best ordered and most tranquil home. Thus, in providing the utmost that exacting affection and sanitary science can require, and in taxing to the utmost the resources of art, in architecture, in sculpture, and in the use of subdued and according hues and forms for appropriate decoration, these "Campo Santos," or "Mausoleums," or "Mansions of the Dead," will seem to have realized the ideal disposition of the mortal remains of those who depart this life.



In conclusion, it is evident that the present modes of disposing of the dead are unscientific, unwholesome, repulsive, and, in a word, unworthy of this enlightened age.

On the other hand, it is apparent that the New Mausoleum method of disposing of the dead affords relief from all these obnoxious features, inasmuch as it provides for the perpetual care of the dead; protects from premature interment; protects the dead from theft; protects the living from exposure while paying the last duty to the dead; meets the demand of the most reverent and tender sentiment; meets the urgent sanitary demand that the dead shall not endanger the living; meets the medico-legal demand that the evidence of crime shall not be destroyed; and costs less, in view of its manifold advantages.

XXXI.

THE NEW YORK QUARANTINE ESTABLISHMENT.

By WM. M. SMITH, M. D.,

Quarantine Officer Port of New York.

A BRIEF STATEMENT OF ITS HISTORY AND PRESENT CONDITION.

In the following an attempt will be made,—

1. To give briefly the reason for the location of the principal part of the New York quarantine establishment in the lower bay of New York.
2. To explain how it happens that the quarantine authorities are making the extensive improvements in the establishment located there at this time.
3. To explain why the quarantine authorities have resorted to cremation of the dead who die of contagious or infectious diseases at the Quarantine hospital.

The jurisdiction of the New York quarantine is made by legislative enactment, coëxtensive with the upper and lower bay of New York, as shown in the first stereoptic view. It extends from Sandy Hook, on the south, to Hell Gate, at the entrance to Long Island Sound.

The first quarantine established at the port of New York was authorized by the state legislature in 1794. It authorized the governor of the state to appropriate Governor's Island for quarantine purposes, to erect hospitals, reception buildings, etc.

The epidemic of yellow-fever in New York in 1798 created a demand for more efficient measures of protection from the pestilence.

The insecurity which was felt from the proximity of the quarantine establishment at Governor's Island to the city caused an act of the legislature in 1799 which authorized the purchase of a site on Staten Island for a boarding station and marine hospital. The site selected was at Tompkinsville, Staten Island.

Again: In 1803 an epidemic of yellow-fever occurred in New York, which numbered six hundred victims. In several subsequent years, between the last named date and 1860, yellow-fever developed in epidemic proportions in New York and among the populations of the shores adjacent to the bay of New York.

Although there was a feeling of comparative safety entertained by citizens of New York and Brooklyn by the removal of the quarantine establishment from Governor's Island to Tompkinsville, this feeling was by no means shared by the citizens of Staten Island, and petitions and remonstrances alternately urged the legislature to remove the quarantine from Tompkinsville. An epidemic of yellow-fever on Staten Island in 1848 intensified the feeling of opposition on the part of the citizens of the island to the quarantine as established.

A committee appointed by the legislature tried to secure a location at Sandy Hook, but New Jersey objected. A location at Coney Island Point was attempted, but was finally abandoned. The committee selected and secured a site at Seguine's Point, on the extreme southern portion of Staten Island, where buildings and piers were constructed, preparatory to the removal of the quarantine from Tompkinsville. The people of the vicinity, however, turned out on the night of May 6, 1857, and burned or otherwise destroyed everything that had been constructed.

The state again endeavored to secure from New Jersey a site at Sandy Hook for quarantine purposes, and failed. In 1858 the committee tried to obtain a place at Orchard Shoals, situated about midway between the southern extremity of Staten Island and West Bank, in the lower bay, but the negotiations to secure these locations also failed.

The night of September 1 and 2, 1858, an organized mob of the people of Staten Island assembled and destroyed all the hospitals and most of the property of the state at the quarantine establishment at Tompkinsville, S. I.

All efforts to secure a site for quarantine purposes having failed, the state commissioners were literally driven into the sea for a location. For a temporary purpose they purchased the steamship "Falcon," and located it below the narrows, in the lower bay, for a hospital for fever patients. The steamers "Illinois" and "Empire City" were afterwards obtained from the general government for quarantine purposes. For many years, and until 1888, since which time the "S. D. Carlton" has taken its place, the "Illinois" was anchored five miles below the narrows, during the warm or yellow-fever season, on which a deputy health officer was located to inspect vessels from the West Indies, Mexican and gulf ports, the east coast of South America, Central America, and the west coast of Africa. For several years the vessels named were anchored in the lower bay, and used for quarantine and hospital purposes.

In the meantime an artificial island had been made on the west bank, a sand bar two miles in length and half a mile in width, formed by the immense force and volume of the waters discharging from the Hudson and East rivers through the narrows, on which a hospital building was erected and completed in 1869, now known as Swinburne Island Hospital. About a mile above this hospital, on the same bar or bank, another artificial island was made, and buildings were erected, designed for a quarantine of observation. This island was completed in 1872, and is known as Hoffman Island. This portion of the New York quarantine establishment was never completed, or properly equipped for the purposes for which it was designed.

In 1874 a boarding station, for the inspection of vessels from non-infected ports, was located at the narrows, a short distance above Fort

Wadsworth. The residences of the health officer and of the deputy health officers are at this station.

When, in 1884, cholera invaded Europe, there was a general impression that it would reach our shores at some place on our extensive seaboard. The imperfectly equipped condition of the quarantine of observation at Hoffman Island, for the care of cholera infected immigrants, caused great anxiety to the quarantine officials at the New York quarantine. The state board of health visited the establishment at the request of the health officer of the port, and by resolution urged the state government to properly equip this portion of the quarantine establishment.

In November (20th) of the same year, a conference, composed of gentlemen eminent as physicians and sanitarians, met by invitation at the rooms of the New York Board of Health, and discussed the situation. The conference resolved that in view of the probability of the advent of cholera, the condition of Hoffman Island as a quarantine for cholera infected immigrants was a standing menace to the public health, and urged upon the state government the necessity for repairs and equipment for such an emergency. Nevertheless little was done to prepare for the pestilence, which arrived at the threshold of the port on the steamer "Alesia," September 23, 1887, and, on the 13th of the following month, on the steamer "Britannia." The imminence of the danger of the escape of the pestilence from the quarantine establishment, where upwards of 600, more or less, infected immigrants were under observation, and 406 others on the steamer "Britannia," who could not be removed to the quarantine of observation for lack of facilities for isolation and proper care, aroused the municipal and state authorities to a consideration of the condition of that portion of the establishment. They were fully aroused to the consideration of the disastrous consequences which would result from an epidemic of cholera, not only to the lives and health of the people, but to the financial interests of the country.

At the session of the legislature succeeding the advent of cholera at the New York quarantine, an appropriation was made, with which the necessary repairs and equipment of Hoffman Island were commenced. At the last session (1889) a farther appropriation was made, which nearly completed them, according to the plans and specifications, which are shown, so far as they can be, without going into details. (Second stereoptic view.)

The island is surrounded by a heavy rip-rap wall, with the exception of a slip on the western face of the island for the discharge of baggage, provisions, etc. Interior to the rip-rap wall are cribs of timber extending down to low water mark, and filled with stone, compactly laid. On these are laid broken stone for the reception of concrete, which have a gentle slope to the gutter next to the rip-rap wall. Immediately interior to the cribs is a substantial concrete wall, extending from low water mark to a foot above the concrete covering of the crib-work. Interior to this the surface of the island is covered with asphalt laid on cement. The dock forming the slip has been entirely reconstructed during the past year.

The buildings on Hoffman Island are four in number: two original dormitories 137 by 61, two stories in height, an administration building 40 by 50, and a building recently erected which is 109 by 51 feet. The last mentioned structure contains twin boilers of 75 horse-power, for steam heating, pumps, wash-room, laundry, and dining-rooms, which are located on the first floor. These boilers also supply steam for the disinfection and drying rooms, on the second floor, which will later be more fully described.

A portable galvanized iron partition across the island, from the head of the slip to the rip-rap wall on the east side of the island, passes between the north and south dormitories, so as to entirely isolate the occupants of one building from the other. A door in the partition where it crosses the coping of the concrete wall affords communication between the dormitories when it is necessary. The interior of each of the dormitories is divided into four sections, two on each floor—one for males and one for females. The partitions making these divisions are galvanized iron, eight feet in height, and continued from the top of the wall to the ceiling by a heavy net-work of galvanized iron wire. The floors of the dormitories are covered with two heavy coatings of Duresco, followed by metallic paint as high as the partitions, thus rendering them impervious. The berths in the dormitories are arranged in two tiers, one above the other, on the sides and ends: each cot or berth is made of wrought iron, and so hung to the wall that it can be triced up and fastened to the wall when not in use. At the end of the dormitories, where the closets were formerly located, bath-tubs have been placed. Each building is supplied with sixteen bath-tubs on each floor. A two-story annex closet has been built on the east side and centre of each of the dormitories, with twelve seats on each story. The occupants of one of these divisions in the dormitories can pass to and from the closets without coming in contact with those of any other division, if complete isolation is desirable. Each closet is flushed from a tank above. The dejecta are received into a porcelain lined trough in the basement of the annex, which has an incline of one fourth inch to the foot toward the sewer. Under ordinary circumstances the sewer end of this trough will be open, but it is supplied with a stop-valve that fits closely the opening into the sewer when it is desirable to have the trough supplied with a disinfecting solution. A handle and chain in the closet connects with the valve, by which it is opened or closed as may be desired.

The galvanized partitions, external to the south dormitory, are so designed as to afford absolute isolation for four groups, and give each group an opportunity for closet accommodation and to take their meals and fresh air without contact with the members of any other group. The south building was selected for this purpose from its proximity to the dining-rooms of the new building.

Three principal objects have been sought in the arrangements to which reference has been made:

First. To cover all surfaces, external to and in the interior of the buildings, likely to conceal or retain any infectious or contagious material, with a non-absorbent and impermeable material.

Second. The removal of the closets to annex buildings; to provide facilities for disinfecting the sewage, and to minimize exposure to the infection from cholera infected persons.

Third. To secure absolute isolation for several groups, and give each and every person in them access to fresh air, to the dining-room, and to the annex.

The administration building is the residence of the superintendent. This building has been thoroughly renovated. A stairway has been built from its northern face, which communicates with a hall in the second story, along which are arranged several rooms furnished and equipped for an emergency hospital. At the end of the hall, a partition cuts off all communication with the superintendent's apartments.

The fourth or new building, in which are located the boilers and pumps, the baggage, disinfecting, and drying rooms, will require more particular notice.

THE VACUUM PUMP.

The exhaust pump consists of Knowles's Special Duplex crank and fly-wheel vacuum pump, of the size known as 8 by 12 by 8 inches, brass fitted, with governor, chronometer valve, patent oiler, water seal, with suction exhaust and drip connections, so arranged with valves and gates that the various sub-divisions of the disinfecting rooms may be operated singly or together.

A charging pump is also located in the boiler-room, and consists of a Worthington Duplex Steam Pump, of the size known as 6 by 4 by 6. This pump will be used for the purpose of charging the exhausting pump.

STEAM COILS.

In the disinfecting-room seven distinct coils are placed in sections; each coil consists of two manifold headers made of 4-inch extra heavy wrought-iron pipe, placed lengthwise in the section and the full length of the same. Each header is tapped for 1-inch pipe, and the holes spaced three inches from centre to centre. The headers are arranged one above the other, and into each screw 1-inch pipes are connected at their opposite ends with return bends and nipples. With the above named, top and bottom pipes are connected by return bends, two additional pipes, making four in all, set vertically, and connecting with the 1-inch holes in the steam and return headers. The total amount of pipes placed in the seven coils described is about 6,000 lineal feet. Each coil has its separate steam and return connection, with full sized valve in each connection.

The steam supply is taken directly from the power connection at each boiler, and arranged with valves in each connection, so that either one or both boilers may be used to supply steam to pumps or coils. Separate mains are provided for coil service. The main power supply-pipe for pumps is four inches, the exhaust pipe from the pump is 3½ inches, and extends above the roof of the building. The location of the air suction pipe to the vacuum pump is on the ceiling of the first floor of the boiler-house, so as best to secure the purpose for which it is designed. Outlets are provided for the pipe, with connections to the sections of the disinfecting rooms. Each section is provided with a quick opening valve, with lever and handle attached, and arranged so that each gate may be controlled by attendants on the boiler-room floor, while the outlets in the disinfecting rooms are provided with air-tight screw-top caps, so arranged as to be easily removed and replaced with a brass strainer. The discharge or exhaust from the air chamber of the pump is twelve inches, and connected to the pump, and is extended to the chimney of the furnace. The drip connections from the pumps and exhaust pipes are connected together and run into a discharge trap, with discharge connections. The returns from the coils are connected into three No. 4 Nason traps; the discharge from the same is connected, and discharge into the receiving tank in the boiler-room. The valves on the sections of heating coils are arranged to control coils outside of each room, each section to have perforated pipes the full lengths of sections. Each set of pipes has controlling valves.

On the exterior of each compartment or division of the disinfecting-room are placed, near the ceiling, six 2-inch gate valves, connected to the pipes running above the room. All the live steam pipes in the boiler-room are fitted and covered. Connected with each expand pipe from the disinfecting chambers above the valve on the same is a 1½-inch galvanized iron pipe, connected with a 2½-inch main pipe, which latter connects with the drip tanks. Attached to the tanks are two 1⅞-inch stop-cocks, with the necessary lengths of 1⅞-inch galvanized iron pipe, which run into the ground.

GAUGES AND THERMOMETERS.

Gauges and thermometers are so placed as to indicate the pressure and temperature of the disinfecting-room. For this purpose are used three high range thermometers and three vacuum gauges, each having the necessary valve and pipe connections, with dial boards and fixtures complete. The gate-valves used are of the Ludlow double-gate pattern; the other valves are of Jenkins Bros. patent, 2½ inches and above.

DISINFECTING CHAMBERS.

The disinfecting rooms are made as nearly air-tight as possible. The ceilings and partitions are made of $\frac{3}{16}$-inch iron, well lapped and riveted, caulked, and thoroughly fitted. The ceiling, floors, and partitions are lined with iron, and with doors of the same in partitions, and for shutters to windows. The doors and room are calculated to withstand the pressure of 7½ pounds per square inch. The partitions are secured in place by 4-inch beams and angle irons, held in place by bolts and rivets bolted to the beams. Each door dividing the sections is hung and set in such a manner as to be perfectly air-tight when closed. The window shutters are made and hung the same as the doors; all have rubber stops.

Wire Baskets and Frame Work.—One hundred and eight galvanized iron baskets of No. 14 wire and 1-inch mesh are in position for use; each with sufficient capacity for the baggage of one person or family, or, more exactly, each basket is 6½ by 4½ feet, framed in wire, with stiffening bands. Each series or set of three baskets is suspended and run on overhead tracks, so arranged as to slide out the full length of each basket.

All steam and exhaust pipes are covered with 1-inch hair-felt resin-sized paper and canvas.

A Drying-Room, 109 by 51 feet, for baggage and clothing after it is disinfected, is connected with the disinfecting chambers by a short hall, in which a small railway and car are to be constructed to carry baskets from the disinfecting-room to the drying-room.

CREMATORY AND MORTUARY.

During the past year a crematory and mortuary have been erected on Swinburne Island. In my annual report for two years I recommended that a crematory should be added to the improvements at Swinburne Island, otherwise named "Swinburne Island Hospital." The location of the state cemetery at Seguine's Point has ever been difficult of access. The inhabitants, it will be remembered, burned and destroyed the docks and buildings that the state attempted to erect at Seguine's Point. The burial of the dead of contagious or infectious diseases has for years been a source of anxiety to the inhabitants in the vicinity of the cemetery, and finally threats of mob violence to those engaged in the burial of the dead were so frequently made by the inhabitants residing in the vicinity that those employed for this duty were much intimidated.

The legislature of 1888 directed the removal of the remains of the dead from the state cemetery at Seguine's Point. The act provides that the remains of the dead shall be "disposed of in such manner as will not endanger the public health."

XXXII.

FOOD AND HEALTH.

By Prof. W. O. ATWATER,

DIRECTOR OF OFFICE OF EXPERIMENT STATIONS, U. S. DEPARTMENT OF AGRICULTURE.

> I have come to the conclusion that more than half the disease which embitters the middle and latter part of life is due to avoidable errors in diet, ... and that more mischief in the form of actual disease, of impaired vigor, and of shortened life accrues to civilized man . . . . in England and throughout Central Europe from erroneous habits of eating, than from the habitual use of alcoholic drink, considerable as I know that evil to be.—*Sir Henry Thompson.*

I have quoted the above, from an eminent physician, because it expresses a belief which is current among hygienists, and because it coincides with observations of my own made from the somewhat different standpoint of the physiological chemist.

The error which Sir Henry Thompson most seriously deplores is over-eating. "It is a failure to understand, first, the importance of preserving a near equality between the supply of nutriment to the body and the expenditure produced by the activity of the latter, and, secondly, ignorance of the method of attaining this object in practice, which gives rise to the various forms of disease calculated to embitter and shorten life."

The object of the present paper is to call attention very briefly and without detailed discussion to some statistics of food and dietaries which imply that we as a people, or at least many of us, are more addicted to the habit of over-eating than we realize. The statistics are the result of two investigations prosecuted under my direction, in the chemical laboratory of Wesleyan University. One of these investigations was made at the instance, and with the aid, of the Smithsonian Institution and the U. S. Fish Commission, on the composition of some of our more common food materials. The other, on dietaries, especially of working people, was made in connection with the Massachusetts Bureau of Statistics of Labor. They indicate that in this country not only well-to-do people, but those in moderate circumstances also, use a needless quantity of food; that part of this excess, however, is simply thrown away, so that the injury to health, however great, is doubtless much less than if all were eaten; that one great fault with our dietaries is an excess of meats and perhaps of sweetmeats; that even among those who desire to economize there is great pecuniary loss from the selection of materials in which the actual nutrients are actually, though not apparently, dearer than need be; that many people whose means are limited make still

CHART I.

Nutritive Ingredients and Refuse, and Amount of Potential Energy in Food Materials.

PERCENTAGES INDICATED BY SHADED SPACES.

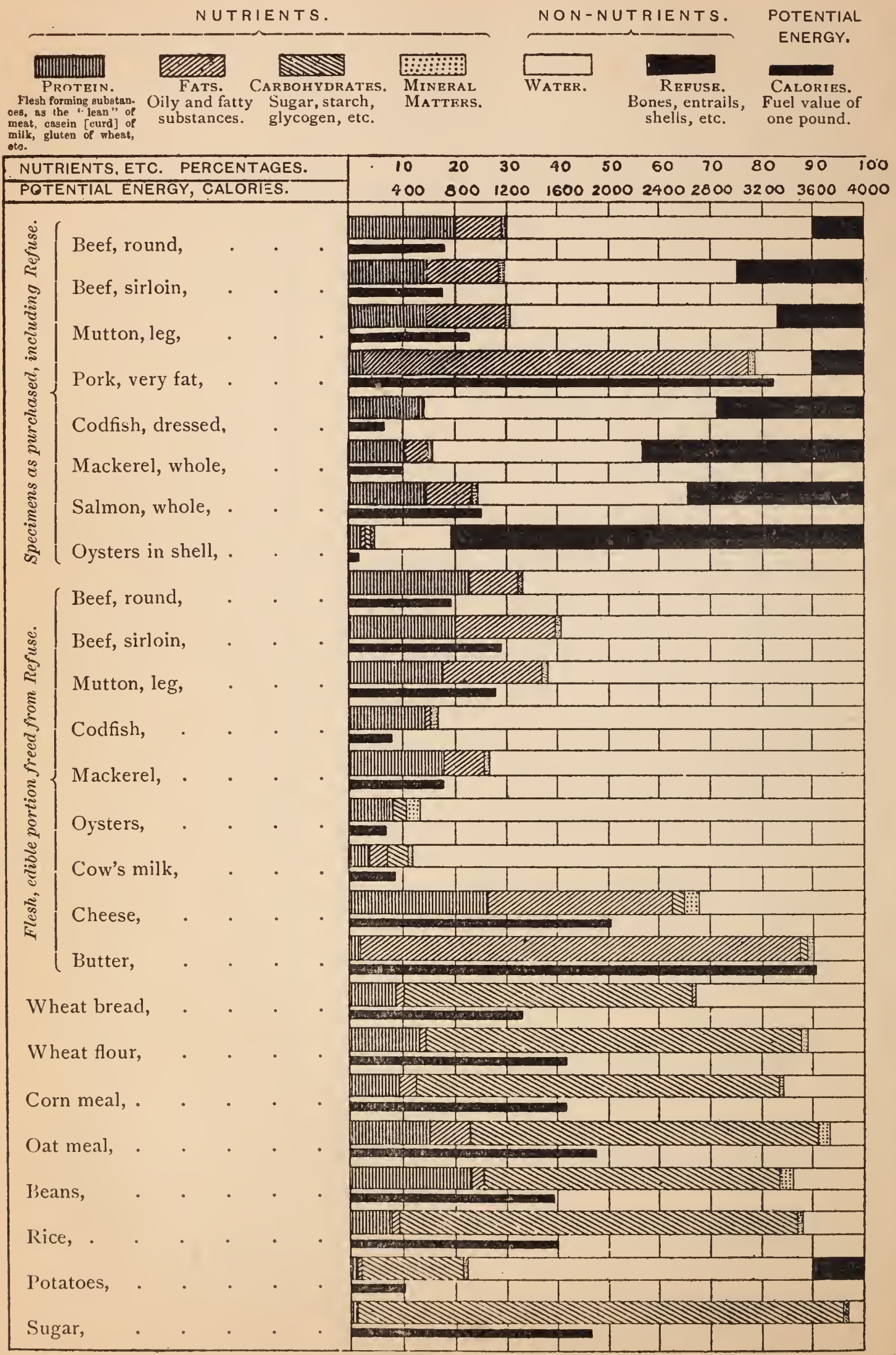
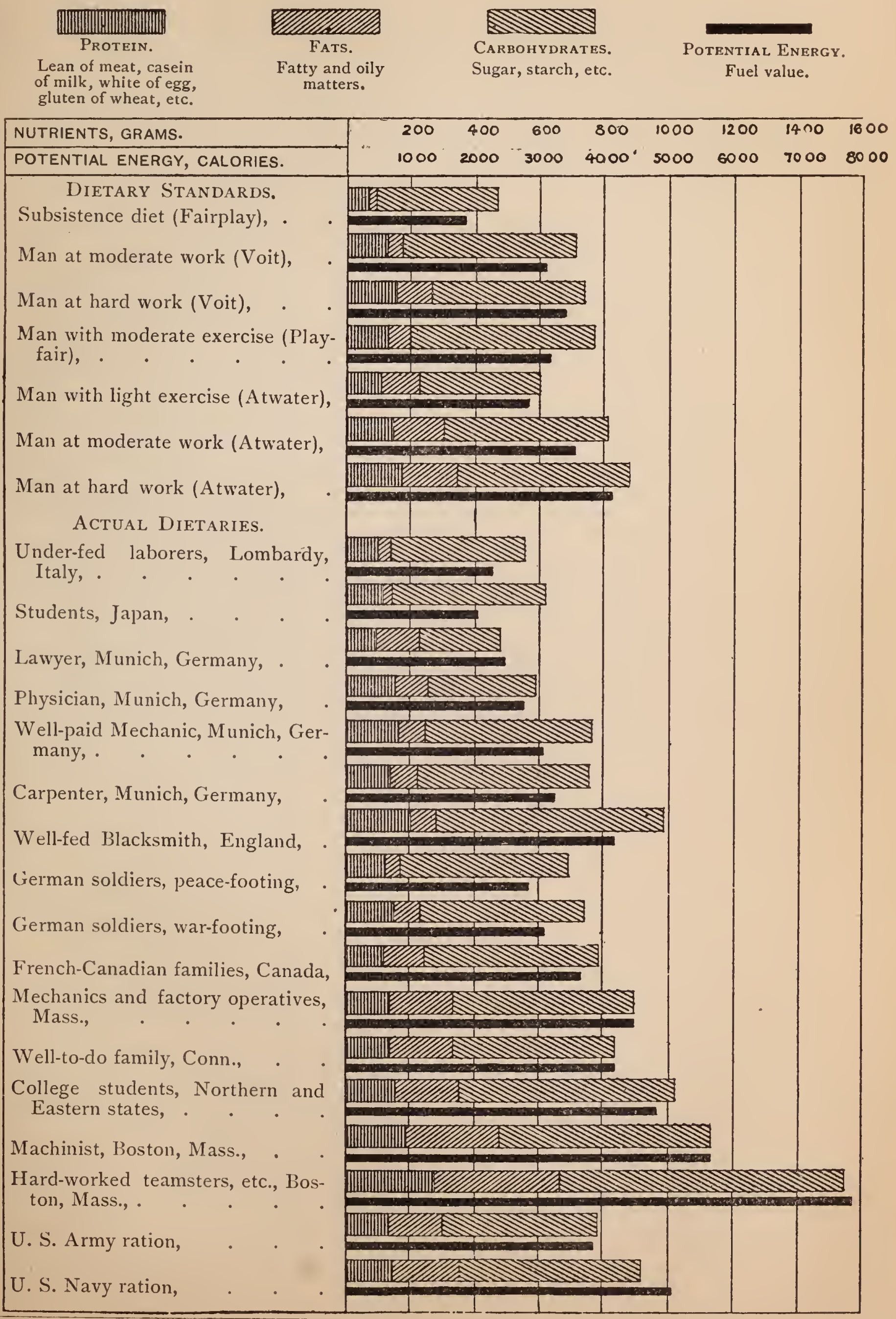


CHART II.

Standards for Daily Dietaries and Actual Dietaries of People of Different Classes.

WEIGHTS OF NUTRIENTS AND CALORIES OF ENERGY IN NUTRIENTS IN FOOD PER DAY.



more serious mistakes in their choice of food, so that they are often inadequately nourished when they might be well fed at less cost; and, what seems the most painful thing of all, that it is generally the very poor who practice the worst economy in the purchase, as well as in the use, of their food. It is, however, of the relations between the demands of the body for nourishment and the food ordinarily consumed, that I wish particularly to speak.

Before entering upon the special theme, it may be well to recapitulate very briefly some of the fundamental principles of the theory of nutrition to which the latest research has led. For this purpose we must consider the ingredients of our food materials, and their functions in nutrition.

The following tables and explanatory statements are an attempt to epitomize some results of late research, a considerable portion of which have not yet become current in treatises in English.[1] Those regarding digestibility, potential energy, and functions of nutrients are based upon experimental inquiry in Europe, especially in Germany. The data employed for the tables of dietary standards and actual dietaries are mainly European, but include a considerable number of the results of observations above referred to as made in the United States. The figures for the composition of food-materials are taken mostly from the investigations which were mentioned above as executed in behalf of the Smithsonian Institution and the United States Fish Commission, but the results of which still await detailed publication.

INGREDIENTS OF FOOD-MATERIALS.—NUTRIENTS AND NON-NUTRIENTS.

Our ordinary food-materials, such as meat, fish, eggs, potatoes, wheat, etc., consist of—

Refuse, as the bones of meat and fish, shells of eggs, skin of potatoes, and bran of wheat.

Edible portion, as the flesh of meat and fish, white and yolk of eggs, wheat flour.

The edible substance consists of—

Water.

Nutritive ingredients or Nutrients.

The principal kinds of nutrients are—

1. *Protein.*
2. *Fats.*
3. *Carbohydrates.*
4. *Mineral matters.*

Water, refuse, and the salt of salted meat and fish are called non-nutrients. The water contained in foods and beverages has the same composition and properties as other water; it is, of course, indispensable for nourishment, but is not a nutrient in the sense in which the term is here used. In comparing the values of different food-materials for nourishment, the refuse and water are left out of account.

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[1] See articles on the Chemistry of Food and Nutrition in *Century Magazine* for 1887 and 1888. The statements and tables which follow are in large part adopted from these, and from an article in Vol. I of the National Medical Dictionary.

The nutritive materials or nutrients may be divided into several classes, of which the most important are protein, fats, carbohydrates, and mineral matters. Of course there are compounds which properly do not belong to either of these classes, but for our present purpose they may be neglected.

The following are familiar examples of compounds of each of the four principal classes of nutrients :

PROTEIN—*a.* Albuminoids, *e. g.*, albumen (white of eggs); casein (curd) of milk; myosin, the basis of muscle (lean meat); gluten of wheat, etc. *b.* Gelatinoids: *e. g.*, collagen of tendons; ossein of bones, which yield gelatine or glue. (Meats and fish contain very small quantities of so-called "extractives." They include kreatin and allied compounds, and are the chief ingredients of beef-tea and meat-extract. They contain nitrogen, and hence are commonly classed with protein.)

FATS—*e. g.*, fat of meat; fat of milk (butter); olive oil; oil of corn, wheat, etc.

CARBOHYDRATES—*e. g.*, sugar, starch, cellulose (woody fibre).

MINERAL MATTERS—*e. g.*, calcium phosphate or phosphate of lime; sodium chloride (common salt).

It is to be especially noted that the protein compounds contain nitrogen, while the fats and carbohydrates have none. The albuminoids and gelatinoids are frequently classed together as proteids. The term "proteids" is also used to include all the nitrogenous ingredients—*i. e.*, synonymous with protein. The average composition of these compounds is about as follows :

	Protein.	Fats.	Carbohydrates.
Carbon,	53 per cent.	76.5 per cent.	44 per cent.
Hydrogen,	7 "	12.0 "	6 "
Oxygen,	24 "	11.5 "	50 "
Nitrogen,	16 "	None.	None.
	100 per cent.	100 per cent.	100 per cent.

Different specimens of the same kind of food-material differ widely in composition. The figures in Table I, herewith, represent the average of analyses, of which those of fruits and beverages are European, and the rest American.

TABLE I.

Percentages of Nutrients (Nutritive Ingredients), water, etc., and estimated potential energy (fuel-value) in specimens of food-materials.

FOOD-MATERIALS.	REFUSE:	EDIBLE PORTION.						Calories of potential energy in 1 pound of each material.
	bones, skin, shells, etc.	Water.	Nutrients.					
			Total.	Protein.	Fats.	Carbohydrates.	Mineral matters.	
Animal foods as purchased, including edible portion and refuse:	per cent.	per ct.	per ct.	per cent.	per ct.	per ct.	per cent.	
Beef, side[1]	19.7	44.0	36.3	13.8	21.7	......	0.8	1170
Beef, round[1]	10.0	60.0	30.0	20.7	8.1	......	1.2	725
Beef, neck[1]	19.9	49.6	30.5	15.4	14.3	......	0.8	890
Beef, sirloin[1]	25.0	45.0	30.0	15.0	14.3	......	0.7	885
Beef, flank[1]	11.7	24.2	64.1	10.6	52.9	......	0.6	2430
Mutton, side[1]	20.0	42.9	37.1	13.2	23.2	......	0.7	1225
Mutton, leg[1]	18.4	50.4	31.2	15.0	15.5	......	0.7	935
Mutton, shoulder[1]	16.8	48.7	34.5	15.0	18.7	......	0.8	1070
Mutton, loin (chops)[1]	16.3	41.3	42.4	12.5	29.3	......	0.6	1470
Smoked ham	14.0	36.3	49.7	14.6	34.2	......	0.9	1715
Pork, very fat	10.4	9.5	80.1	2.8	76.5	......	0.8	3280
Chicken[2]	41.6	42.2	16.2	14.2	1.2	......	0.8	315
Turkey	35.4	42.8	21.8	15.4	5.6	......	0.8	525
Flounder, whole	66.8	27.2	6.0	5.2	0.3	......	0.5	110
Haddock, dressed	51.0	40.0	9.0	8.2	0.2	......	0.6	160
Bluefish, dressed	48.6	40.3	11.1	9.8	0.6	......	0.7	210
Brook trout, whole	48.1	40.4	11.5	9.8	1.1	......	0.6	230
Codfish, dressed	29.9	58.5	11.6	10.6	0.2	......	0.8	205
Whitefish, whole	53.5	32.5	14.0	10.3	3.0	......	0.7	320
Shad, whole	50.1	35.2	14.7	9.2	4.8	......	0.7	375
Turbot, whole	47.7	37.3	15.0	6.8	7.5	......	0.7	445
Mackerel, fat, whole	33.8	42.4	23.8	12.1	10.7	......	1.0	675
Mackerel, lean, whole	38.3	48.5	13.2	11.2	1.4	......	0.6	265
Mackerel, average, whole	44.6	40.4	15.0	10.0	4.3	......	0.7	365
Halibut, dressed	17.7	61.9	20.4	15.1	4.4	......	0.9	465
Salmon, whole	35.3	40.6	24.1	14.3	8.8	......	1.0	635
Eel	36.0	33.8	30.2	8.6	21.0	......	0.6	1045
Salt codfish	42.1	40.3	17.6	16.0	0.4	......	1.2	315
Smoked herring	50.9	19.2	29.9	20.2	8.8	......	0.9	745
Salt mackerel	40.4	28.1	31.5	14.7	15.1	......	1.7	910
Canned salmon	4.9	59.3	35.8	19.3	15.3	......	1.2	1005
Canned sardines	5.0	53.6	41.4	24.0	12.1	......	5.3	955
Lobsters	62.1	31.0	6.9	5.5	0.7	0.1	0.6	135
Oysters in shell	82.3	15.4	2.3	1.1	0.2	0.6	0.4	40
Hens' eggs	13.7	63.1	23.2	11.8	10.2	0.4	0.8	655
Animal foods, edible portion:								
Beef, side[1]	....	54.7	45.3	17.2	27.1	......	1.0	1465
Beef, round[1]	....	66.7	33.3	23.0	9.0	......	1.3	805
Beef, sirloin[1]	....	60.0	40.0	20.0	19.0	......	1.0	1175
Mutton, side[1]	....	45.9	54.1	14.7	38.7	......	0.7	1905
Mutton, leg[1]	....	61.8	38.2	18.3	19.0	......	0.9	1140
Mutton, loin (chops)[1]	....	49.3	50.7	15.0	35.0	......	0.7	1755
Flounder	....	84.2	15.8	13.8	0.7	......	1.3	285
Codfish	....	82.6	17.4	15.8	0.4	......	1.2	310
Mackerel, fat	....	64.0	36.0	18.2	16.3	......	1.5	1025
Mackerel, lean	....	78.7	21.3	18.1	2.2	......	1.0	430
Mackerel, average	....	71.6	28.4	18.8	8.2	......	1.4	695

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[1] From well-fattened animals. [2] Rather lean.

TABLE I.—*Concluded.*

FOOD-MATERIALS.	REFUSE:	EDIBLE PORTION.						Calories of potential energy in 1 pound of each material.
	bones, skin, shells, etc.	Water.	Nutrients.					
			Total.	Protein.	Fats.	Carbohydrates.	Mineral matters.	
Animal foods, edible portion:	per cent.	per ct.	per ct.	per cent.	per ct.	per ct.	per ct.	
Salmon	....	63.6	36.4	21.6	13.4	......	1.4	965
Oysters, fat	....	81.7	18.3	8.0	1.7	6.7	1.9	345
Oysters, lean	....	90.9	9.1	4.2	0.6	1.8	2.5	135
Oysters, average	....	87.1	12.9	6.0	1.2	3.7	2.0	230
Hens' eggs	....	73.1	26.9	13.7	11.7	0.5	1.0	760
Cows' milk	....	87.4	12.6	3.4	3.7	4.8	0.7	310
Cows' milk, skimmed	....	90.7	9.3	3.1	0.7	4.8	0.7	175
Cheese, whole milk	....	31.2	68.8	27.1	35.5	2.3	3.9	2045
Cheese, skimmed milk	....	41.3	58.7	38.4	6.8	8.9	4.6	1165
Butter	....	10.0	90.0	1.0	85.0	0.5	3.5	3615
Oleomargarine	....	10.0	90.0	0.6	84.5	0.4	4.5	3585
Lard	....	1.0	99.0	....	99.0	......	....	4180
Vegetable foods:								
Wheat bread	....	32.7	67.3	8.9	1.9	55.5	1.0	1280
Wheat flour	....	11.6	88.4	11.1	1.1	75.6	0.6	1660
Graham flour	....	13.0	87.0	11.7	1.7	71.8	1.8	1625
Rye flour	....	13.1	86.9	6.7	6.7	78.7	0.7	1620
Buckwheat flour	....	13.5	86.5	6.5	1.3	77.6	1.1	1620
Beans	....	13.7	86.3	23.2	2.1	57.4	3.6	1585
Oatmeal	....	7.7	92.3	15.1	7.1	68.1	2.0	1845
Corn (maize) meal	....	14.5	85.5	9.1	3.8	71.0	1.6	1650
Rice	....	12.4	87.6	7.4	0.4	79.4	0.4	1630
Sugar	....	2.2	97.8	0.3	......	96.7	0.8	1800
Potatoes	10.0	68.0	22.0	1.8	0.2	19.1	0.9	395
Potatoes	....	75.5	24.5	2.0	0.2	21.3	1.0	440
Sweet potatoes	....	75.8	24.2	1.5	0.4	21.1	1.2	435
Turnips	....	91.2	8.8	1.0	0.2	6.9	0.7	155
Carrots	....	87.9	12.1	1.0	0.2	10.1	0.8	215
Cabbage	....	90.0	10.0	1.9	0.2	6.2	1.2	170
Melons	....	95.2	4.8	1.1	0.6	2.5	0.6	90
Apples	....	84.8	15.2	0.4	......	14.3	0.5	275
Pears	....	83.0	17.0	0.4	......	16.3	0.3	310
Bananas	....	73.1	26.9	1.9	0.6	23.3	1.1	495
Beverages:					Alcohol.			
Lager beer	....	90.3	....	0.4	2.0	5.8	0.2	
Porter and ale	....	88.1	....	0.6	5.1	6.8	0.4	
Rhine wine, white	....	86.3	....	....	9.3	2.3	0.2	
Rhine wine, red	....	86.9	....	....	8.1	3.0	0.3	
French wine, claret	....	88.3	....	....	8.0	2.3	0.2	
Sherry wine	....	79.5	....	....	17.0	3.2	0.3	

[1] As purchased, including refuse, skin, etc.

DIGESTIBILITY OF FOOD.

The discussion of such complex questions as the adaptability of different foods to digestive and assimilative capacities of different persons in different conditions of age, health, and otherwise, would be out of place here. The question of the quantities of nutrients digested is a somewhat simpler matter.

Table II epitomizes the results of some sixty experiments, mostly with men, but a few with children, in which the proportions of the ingredients of food materials actually digested have been found by comparison of amounts and composition of the food eaten with those of the undigested excreta. Table III is computed by applying the data obtained by these experiments to some of those for the composition of food-materials in Table I.

TABLE II.

Digestibility of Nutrients of Food Materials.

In the food-materials below.	Of the total amounts of protein, fats, and carbohydrates, the following percentages were digested:		
	Protein.	Fats.	Carbohydrates.
Meats and fish................	Practically all.	79 to 92	
Eggs..........................	“	96	
Milk..........................	88 to 100	93 to 98	?
Butter........................	....	98	
Oleomargarine.................	....	96	
Wheat bread...................	81 to100	?	99
Corn (maize) meal.............	89	?	97
Rice..........................	84	?	99
Pease.........................	86	?	96
Potatoes......................	74	?	92
Beets.........................	72	?	82

TABLE III.

Proportions of Nutrients Digested and not Digested from Food-materials by Healthy Men.

	PROTEIN.			FATS.			CARBOHYDRATES.			Mineral matters.	Water.
	Digestible.	Undigestible.	Total.	Digestible.	Undigestible.	Total.	Digestible.	Undigestible.	Total.		
	per ct.	per ct.	per ct.	per ct.	pr ct.	per ct.	per ct.	pr ct.	pr ct.	pr ct.	pr ct.
Beef, round	23.0	0.0	23.0	8.1	0.9	9.0	0.0	0.0	0.0	1.3	66.7
Beef, sirloin	20.0	0.0	20.0	17.1	1.9	19.0	0.0	0.0	0.0	1.0	60.0
Pork, very fat	3.0	0.0	3.0	74.5	6.0	80.5	. .	. .	. .	6.5	10.0
Haddock, ...	17.1	0.0	17.1	0.3	. .	0.3	0.0	0.0	0.0	1.2	81.4
Mackerel	18.8	0.0	18.8	7.4	0.8	8.2	0.0	0.0	0.0	1.4	71.6
Hens' eggs	13.4	0.0	13.4	9.4	2.4	11.8	0.7	0.0	0.7	1.0	73.1
Cows' milk	3.4	0.0	3.4	3.6	0.1	3.7	4.8	0.0	4.8	0.7	87.4
Cheese, whole milk . .	27.1	0.0	27.1	34.6	0.9	35.5	2.3	0.0	2.3	3.9	31.2
Butter	1.0	. .	1.0	85.8	1.7	87.5	0.5	. .	0.5	2.0	9.0
Oleomargarine	0.4	. .	0.4	83.9	3.3	87.2	0.0	. .	0.0	2.1	10.3
Sugar	0.3	. .	0.3	. .	. .	. .	96.7	0.0	96.7	0.8	2.2
Wheat flour very fine . . .	7.6	1.3	8.9	1.0	. .	1.0	74.4	0.8	75.2	0.3	14.6
medium . . .	9.5	2.1	11.6	0.8	. .	0.8	70.4	1.8	72.2	0.4	15.0
coarse, whole wh.	8.2	2.7	10.9	1.8	. .	1.8	66.4	5.3	71.7	1.2	14.4
Wheat bread, average .	7.7	1.2	8.9	1.9	. .	1.9	54.9	.6	55.5	1.0	32.7
Black bread	4.5	1.6	6.1	. .	. .	. .	43.3	5.3	48.6	1.5	43.8
Pease	19.7	3.2	22.9	1.8	. .	1.8	55.7	2.1	57.8	2.5	15.0
Corn (maize) meal . .	7.9	1.2	9.1	3.8	. .	3.8	68.7	2.3	71.0	1.6	14.5
Rice	6.2	1.2	7.4	0.4	. .	0.4	78.7	0.7	79.4	0.4	12.4
Potatoes	1.5	0.5	2.0	0.2	. .	0.2	19.7	1.6	21.3	1.0	75.5
Turnips	0.7	0.3	1.0	0.2	. .	0.2	5.6	1.3	6.9	0.7	91.2

POTENTIAL ENERGY OF FOOD.

In being consumed in the body as fuel to furnish heat and muscular energy the nutrients appear to replace one another in proportion to their potential energy, which is accordingly taken as a measure of their fuel-value. The energy is estimated in Calories. The Calorie is the heat which would raise a kilogram of water one degree centigrade (or one pound of water about four degrees Fahrenheit). A foot ton is the energy (power) which would lift one ton one foot. One Calorie corresponds to 1.53 foot-tons. A gram of protein or a gram of carbohydrates is assumed to yield 4.1, and a gram of fats 9.3, Calories. A given weight of fats is thus taken to be equivalent in fuel-value, on the average, to a little over twice the same weight of protein or carbohydrates. The figures for potential energy in Table I are calculated for each food-material by multiplying the number of grams of protein and of carbohydrates in one pound (1 lb. equals 453.6 grams) by 4.1, and the number of grams of fat by 9.3, and taking the sum of these three products as the number of Calories of potential energy in a pound of the material.

USES OF FOOD IN THE BODY.

The principal functions of food and its nutritive constituents may be briefly summarized in the following statements:

Food supplies the wants of the body in several ways. It either—

1. Is used to form the tissues and fluids of the body;
2. Is used to repair the waste of tissues;
3. Is stored in the body for future consumption;
4. Is consumed as fuel, its potential energy being transformed into heat or muscular energy or other forms of energy required by the body; or
5. In being consumed, protects tissue or other food from consumption.

In being themselves burned to yield energy the nutrients protect each other from being consumed. The protein and fats of body-tissues are used like those of food. An important use of the carbohydrates and fats is to protect protein (muscle, etc.) from consumption.

Ways in which materials are used in the body:

Protein forms tissue (muscle, tendon, etc., and fat) and serves as fuel	Yield energy in form of heat and muscular strength.
Fats form fatty tissues (not muscle, etc.) and serve as fuel . .	
Carbohydrates are transformed into fat and serve as fuel . .	
Alcohol does not form tissue, but does serve as fuel . . .	
Tea and coffee (thein, caffein) do not form tissue, do not serve as fuel	Have various actions upon brain and nerves.
Extractives (meat-extract, beef-tea) do not form tissue, do not serve as fuel	

STANDARDS FOR DAILY DIETARIES.

The demands of different people for nutrients in the daily food vary with age, sex, occupation, and other conditions, including especially the widely-differing characteristics of individuals. The standards in Table IV, herewith, are intended to represent, roughly, the needs of average individuals of the classes named. Nos. 1, 3, 4, 5, and 6 are as proposed by Prof. Voit and his followers of the Munich school of physiologists, and are based upon observations of quantities actually consumed in a considerable number of cases. Nos. 7 and 8 are by Voit, and based both upon quantities consumed by individuals under experiment and upon observed dietaries of a much larger number of persons in Germany. Nos. 9, 10, and 11 are by Sir Lyon Playfair, and are based mainly upon observations of actual dietaries in England. No. 2 has been calculated by myself from the data and results used in Nos. 1 and 3. In Nos. 12, 13, 14, and 15 the data of Voit, Playfair, and other European observers are taken into account, but the conclusions are modified by the results of the studies, elsewhere referred to, of dietaries in the United States, where people, wage-workers especially, are better fed, do more work, and receive higher wages.

Table V herewith gives the estimated quantities of nutrients and potential energy (fuel-value) of a number of observed dietaries. The European figures are selected from a large number collated by different observers in England, France, Germany, Switzerland, Italy, and elsewhere. Those here cited are mostly by Prof. Voit and his followers in Germany, and Sir Lyon Playfair in England. The American figures were compiled by myself from observations of some fifty dietaries of private families and boarding-houses in Massachusetts, Connecticut, and Canada. Those for the U. S. Army and Navy rations, however, are based upon the U. S. regulations. Unfortunately these estimates have not the entire accuracy which is to be desired, and which can be obtained only by actual weighings and analyses of the food actually consumed in each case. Such painstaking inquiries with collateral study and experiments are much needed, and, in the interests of pure science, of hygiene, and of the practice of medicine, it is to be hoped that they will be carried out.

TABLE IV.

Standards for Daily Dietaries for People of Different Classes.

		Nutrients.				Potential energy.
		Protein.	Fats.	Carbohydrates.	Total.	
		grams.	grams.	grams.	grams.	Calories.
1	Children to 1½ years, German	28 (20 to 36)	37 (30 to 45)	75 (60 to 90)	140	765
2	Children 2 to 6 years, German	55 (36 to 70)	40 (35 to 48)	200 (100 to 250)	295	1420
3	Children 6 to 15 years, German	75 (70 to 80)	43 (37 to 50)	325 (250 to 400)	443	2040
4	Aged woman, German	80	50	260	390	1860
5	Aged man, German	100	68	350	518	2475
6	Woman at moderate work, German	92	44	400	536	2425
7	Man at moderate work, Voit	118	56	500	674	3055
8	Man at hard work, Voit	145	100	450	695	3370
9	Man with moderate exercise, Playfair	119	51	531	701	3140
10	Active laborer, Playfair	156	71	568	795	3630
11	Hard-worked laborer, Playfair	185	71	568	824	3750
12	Woman with light exercise, writer	80	80	300	460	2300
13	Man with light exercise, writer[1]	100	100	360	560	2815
14	Man at moderate work, writer	125	125	450	700	3520
15	Man at hard work, writer	150	150	500	800	4060

[1]Or woman with moderate work.

One pound avoirdupois = 453.6 grams. One ounce = 28.3 grams.

TABLE V.

Nutrients and Potential Energy in Dietaries of Different People.

	Nutrients.				Potential energy of nutrients.
	Protein.	Fats.	Carbohodrates.	Total.	
European and Japanese dietaries:	grams.	grams.	grams.	grams.	Calories.
1. Sewing girl, London—wages 93 cts. (3s. 9d) per week	53	33	316	402	1820
2. Factory girl, Leipsic, Germany—wages $1.21 per week	52	53	301	406	1940
3. Weaver, England—time of scarcity	60	28	398	486	2138
4. Under-fed laborers, Lombardy, Italy—diet mostly vegetables	82	40	362	484	2192

5.	Trappist monk in cloister; very little exercise—vegetable diet		68	11	469	548	2304
6.	Students, Japan		97	16	438	551	2343
7.	University professor, Munich, Germany; very little exercise		100	100	240	440	2324
8.	Lawyer, Munich		80	125	222	427	2401
9.	Physicians, Munich		131	95	327	553	2762
10.	Painter, Leipsic, Germany		87	69	366	522	2500
11.	Cabinet-maker, Leipsic, Germany		77	57	466	600	2757
12.	"Fully-fed" tailors, England		131	39	525	625	3053
13.	"Well-paid" mechanic, Munich, Germany		151	54	479	684	3085
14.	Carpenter, Munich, Germany		131	68	494	693	3194
15.	"Hard-worked" weaver, England		151	43	622	816	3569
16.	Blacksmith, England		176	71	667	914	4117
17.	Miners at very severe work, Germany		133	113	634	880	4195
18.	Brickmakers (Italians at contract-work), Munich		187	117	675	959	4641
19.	Brewery laborer, Munich; very severe work—exceptional diet		223	113	909	1245	5692
20.	German soldiers, peace-footing		114	39	480	633	2798
21.	German soldiers, war-footing		134	58	489	681	3093
22.	German soldiers, Franco-German War—extraordinary ration		157	285	331	773	4652
	United States and Canadian dietaries:						
23.	French Canadians, working people in Canada		109	109	527	745	3622
24.	French Canadians, factory operatives, mechanics, etc., in Massachusetts		118	204	549	871	4632
25.	Other factory operatives, mechanics, etc., in Massachusetts		127	186	531	844	4428
26.	Glassblowers, East Cambridge, Massachusetts		95	132	481	708	3590
27.	Factory operatives, dressmakers, clerks, etc., boarding-house, Massachusetts		114	150	522	786	4002
28*a*.	Well-to-do private family, Conn.	Food purchased	129	183	467	779	4146
28*b*.		Food eaten	128	177	466	771	4082
29*a*.	College students from Northern and Eastern States; boarding club—two dietaries of the same club	Food purchased	161	204	680	1045	5345
29*b*.		Food eaten	138	184	622	944	4827
30*a*.		Food purchased	115	163	460	738	3874
30*b*.		Food eaten	104	136	421	661	3417
31.	College foot-ball team, food eaten		181	292	557	1030	5742
32.	Machinist, Boston, Mass.		182	254	617	1053	5638
33.	Brickmakers, Middletown, Conn.		222	263	758	1243	6464
34.	Teamsters, marble-workers, etc., with hard work, Boston, Mass.		254	363	826	1443	7804
35.	Brickmakers, Mass.		180	365	1150	1695	8848
36.	U. S. army ration		120	161	454	735	3851
37.	U. S. navy ration		143	184	520	847	4998

In the comparison of the figures of the dietaries of Table V with each other, and with the standards in Table IV, we find the principal data for our present discussion. Let us, first of all, note the difference between the European and the American dietaries in Table V.

Nos. 1, 2, 3, and 4 are those of people regarded as inadequately nourished. No. 1, that of a poor sewing girl in London, contains only 53 grams of protein, and the potential energy of the nutrients is only 1820 Calories, which is just about equal to the subsistence diet proposed by Sir Lyon Playfair,—in other words, just enough to keep body and soul together. The factory woman in Leipsic, Germany, earned $1.21 per week for the support of herself and child. She had about the same amount of food as the London seamstress. The weaver in England in a time of scarcity, and the under-fed laborers in Lombardy, Italy, had but little more, their diet consisting mainly of vegetables.

Nos. 7 and 8, those of a university professor and a lawyer in Munich, Germany, are more liberal. These persons were reasonably well-to-do, but were not engaged in active muscular exercise. Their food supplied from 80 to 100 grams of protein per day, and total nutrients sufficient to yield about 2300 or 2400 Calories of energy. The diet of the physician in Munich, who may very likely have had active muscular exercise, furnished 131 grams of protein and 2760 Calories of energy.

Nos. 10 to 19 are the dietaries of people in England and Germany engaged in more or less strenuous muscular labor. The daily food of the painter and the cabinet-maker in Leipsic had as much potential energy as those of the professor, lawyer, and physician in Munich, indeed a little more; but it contained considerably less protein. The "fully-fed" tailors in England, and the "well-fed" mechanics in Germany had much more protein, and their food had a high fuel value, 3,000 to 3,200 Calories as compared with 2,500 to 2,700 in those of the Leipsic artisans. The hard-worked weaver and the blacksmith in England, and the miners and brickmakers in Germany, were still better fed, as must needs be with their severer work. The protein in their daily diet ranged from 151 to 187 grams, and the potential energy from 3570 to 4640 Calories.

According to the standards above cited, the Leipsic artisans were inadequately nourished, and the well-fed and hard-worked mechanics and others engaged in active muscular labor were far from over-fed. Voit's standard for a man doing moderately hard muscular work provides 118 grams of protein and 3050 Calories of energy; the one proposed by myself provides 125 grams of protein and 3520 Calories of energy. For a man at hard muscular work Voit's standard calls for 2,520 and mine 4,060 Calories.

The largest of the European dietaries is that of a Munich brewery laborer at very severe work. This is the most generous diet that I have found among several hundred collated by European investigators. It supplies 223 grams of protein and 5,690 Calories of energy per day.

It is interesting to note the dietaries of the German soldiers. The ration for times of peace furnishes about 2,800 Calories, that for active service in war some 3,100 Calories. The last, No. 22, represents the ration issued by the order of King William of Prussia, afterwards Emperor of Germany, in the early part of the Franco-German war, when the German armies had reached French soil and were engaged in the extremely hard marching and fighting which resulted shortly after in the victories of Strasburg and Sedan. It was a maxim of Frederick the Great, that "if you wish to build up the army you must begin with the stomach," and Gen. Moltke, who was the actual commander of King William's armies, insisted before the German parliament that for an army nothing was so expensive as insufficient nourishment. This ration, which was deemed sufficient for the severest strain put upon the German soldiers, provided about 157 grams of protein and 4,650 Calories of energy per day.

Coming now to the American dietaries, we observe much more generous allowances of food. How accurately these figures represent the food actually consumed by people generally in this country it is, of course, impossible to say. It will be remembered that the figures are taken from observations of dietaries of people in Massachusetts and Connecticut, though a few were from Canada. They were dietaries of people engaged in manual labor, factory operatives and mechanics, except Nos. 28, 29, 30, and 31, which were those of a well-to-do private family in Connecticut, and of college students, mostly from the Northern and Eastern states, in Wesleyan University, Middletown, Conn. Each is calculated to give the amounts of nutrients and energy per man per day.

Of all the dietaries examined, the smallest was that of a glass-blower in Cambridge, Mass., which supplied 95 grams of protein and 3,590 Calories of energy. The average of the dietaries of factory operatives, etc., examined in Massachusetts, was about 127 grams of protein and 4,500 Calories of energy. The well-to-do family in Connecticut considered themselves quite small eaters, and were surprised to find that their daily dietary furnished over 4,000 Calories of energy.

The college students[1] may, perhaps, be taken as representing the eating habits of young men from families of the class to which they belong, namely, those of the more or less well-to-do people of the Northern and Eastern states whose sons go to college. They took their meals in boarding clubs, the food being purchased by one of their number chosen as steward. It will be observed that there was a very considerable difference between the food purchased and that actually eaten, this difference representing the amounts that went to waste. Of course there are corresponding differences in the other dietaries between the food purchased and that actually eaten, but the data at hand do not suffice to show how large these differences were. Dietaries Nos. 29 and 30 are both of the same club: the second was taken after the results of the first had become known. The steward said that the students were just as well satisfied with their diet in the second case, in which the food purchased represented 3,875 Calories of energy per day, and that eaten, 3,415 Calories, as in the first, when 5,345 Calories were furnished by the food purchased, and 4,325 by that eaten. The college foot-ball team was engaged in very active exercise. The potential energy was estimated at 5,740 Calories per day.

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[1] In Middletown, Conn. (Wesleyan University).

The brickmakers in Middletown, Conn., and the teamsters, marble-workers, etc., in Boston, were engaged in severe muscular labor. Their dietaries furnished from 220 to 250 grams of protein, and from 6,460 to 7,800 Calories of energy per day, while that of the brickmakers in Massachusetts rose to 8,850 Calories of energy per day.

Let us repeat here, that there is one difficulty with all these computations, namely, that we do not know how exactly they represent the food actually consumed. The only way to get the exact figures would be to weigh and analyze the food actually consumed each day in each case. This ought to be done, and when it is done will certainly give results of the highest interest and value. But however inaccurate the estimates here cited may be, it seems hardly reasonable to believe that they can be extremely wide of the truth.

Comparing these with each other and with the dietary standards, taking the potential energy as the basis, it is interesting to note the much larger amounts of food consumed in the American than in the European dietaries.

Leaving out the very poorly fed persons, the European figures range from, say, 2,300 to 4,000 Calories. The German standard for a man of moderate muscular exercise requires 3,050 Calories. The smallest of the American dietaries has 3,600 calories, the largest, 8,850. Roughly speaking, both the protein and the energy in the American dietaries exceeds those of the European by about 50 per cent.

The university professor, the lawyer, and the physician in Munich, Germany, found themselves well nourished with from 2,325 to 2,760 Calories; the people in corresponding occupations in Connecticut have from 3,415 to5,345. The college students, with only light muscular exercise, have as much as the German soldiers under the severest strain of the Franco-German war. The relation between food and intellectual labor or nervous strain is not well understood, and is one of the subjects that pressingly demands experimental study with the appliances that modern science suggests. But I have been unable to find any facts that seem to me to sustain the theory that such large quantities of food are needed for mental effort.

This brings us to the root of the matter. It is doubtless well that the people engaged in hard muscular labor should have large quantities of nutritious food. But is it needful that people of sedentary habits in this country should eat so much? If these figures are to any degree a fair representation of our eating habits, are we not guilty of extreme immoderation? Are we not intemperate in our eating, as we are in our drinking?

I make these suggestions in the form of questions rather than positive statements, partly because the data lack the absolute accuracy that is needed, and partly because I am well aware that it behooves the chemist to be careful in expressing opinions regarding matters outside his specialty. But, as I have collated these figures, and compared them with each other and with the frequent statements I hear from physicians and others regarding our eating habits and the evils that result from them, I have been struck very forcibly by the way those statements and these figures agree.

The data here given suggest a number of topics for consideration, which I can only refer to most briefly, regretting that there is not opportunity to discuss them.

The generous amounts and the nourishing character of the food of American laboring people enable them to do a great deal more work than the European. For this they get higher wages. Other factors come into play to decide the amount of work done, such as superior intelligence, skill in the use of machinery, etc., but I am persuaded that the food is one of the chief, if not the chief. Of course this is not a matter about which a physiological chemist may assume to speak with authority. But the data at hand indicate that the average European workingman is not fed up to his highest producing capacity, and experimental evidence implies that, regarding the body as a machine, the richer food not only means more fuel, but makes the machine itself stronger.

Such facts as those given in these comparisons of American and European dietaries imply that the average laboring man here has what only the exceptionally well-fed man has on the other side of the Atlantic—the food he needs to make the most of himself and his work. There are in this country and in Europe instances in plenty to illustrate what seems to be a general principle, that liberal food, large production, and high wages go together. If it be true that the amount of work done is one of the chief regulating factors of the rate of wages, then the connection between the American's generous diet and his high wages is very clear.

If the statements of numerous writers on physiology and hygiene are correct, one chief cause of corpulance is over-eating. It is interesting to note that such dietaries as those of Banting and Ebstein, when reduced to terms of protein and energy, prove very small indeed. Thus the regimen of the Banting system provides only about 1,100, and that of the Ebstein system 1,400 Calories per day. It is very easy to see why, if these are followed, the amount of fat stored in the body could be rapidly reduced.

It was suggested above, that one chief difficulty with our diet is excessive use of meats and sweetmeats. The details of the analyses of meats and of the composition of the dietaries, of which the condensed results are given in Tables I and V, emphasize this very forcibly, and it is not difficult to see how it comes about, most naturally, that, with the popular ideas of the need of abundant and nutritious food, the ease with which such food is obtained with us, and the lack of specific information on these subjects, we should get into the way of gratifying our palates with little regard to the effect upon our health.

PROCEEDINGS AND DISCUSSIONS OF THE SEVENTEENTH ANNUAL MEETING,

HELD AT

Brooklyn Institute, Brooklyn, N. Y., October 22–25, 1889.

Tuesday, October 22, 1889.

The convention was called to order at 10:30 A. M. by President Johnson. Secretary Watson present.

The President.—Gentlemen, the hour has arrived for the assembling of the American Public Health Association in its seventeenth annual meeting. It will, therefore, come to order. The first business, as arranged by the committee, will be the report of the Local Committee of Arrangements, by its chairman, Dr. Raymond, of Brooklyn.

Dr. J. H. Raymond.—It gives me great pleasure, gentlemen, on behalf of the medical profession and the people and the authorities of the city of Brooklyn, to welcome you to our city. It is the first time in the history of our city that an association of this kind has ever met in our midst, and we appreciate it as a great compliment that you have selected this city as your place of meeting for the present year. I may say that your coming here has been looked forward to with great interest by almost every citizen of Brooklyn, and it will be the earnest endeavor of the people of Brooklyn to make your stay here a welcome and a pleasant one.

It gives me pleasure this morning to announce the privileges and invitations which have been extended to the members of the Association. For the Association's convenience, the Committee on Entertainment has prepared a printed list of the exercises, which will be distributed by the Treasurer, and upon which will be found the details of these privileges so far as they need any explanation.

The trustees of the Hoagland Laboratory extend a cordial invitation to the members of the Association to visit that institution. The time for that visit will be appointed subsequently by the Executive Committee, and the building will be thrown open at that time for inspection.

The authorities of the Long Island College Hospital extend also the same invitation.

Through the kindness of the New York and New Jersey Telephone Company, a telephone has been placed in the Treasurer's room below, for the use of the members, and a messenger call is connected with it, so that if at any time members desire a messenger, they will be promptly supplied. The messenger service is through the kindness of the American District Telegraph Company.

As announced on the programme, the Sanitary Exhibition will be open at 1 o'clock. A brief address explanatory of the exhibition will be made by Dr. A. N. Bell, chairman of the Committee on Exhibits.

I desire to call the attention of the members especially to the public exercise which will be held this evening at the Brooklyn Academy of Music, and to state that it is the request of the chairman of the committee that the members, as they present themselves at the door of the academy, have their badges conspicuously displayed. They will be met there by the Reception Committee, who will escort them to reserved seats.

I also call attention to the visit which is to be made to-morrow to the Hospital Islands at quarantine, and also to the islands connected with the New York Board of Health in the East river, through the courtesy of Dr. William M. Smith, the health officer and one of the members of this Association. A steamboat has been placed at the disposal of the Association, and it is expected that it will leave the bridge dock at 11 o'clock to-morrow precisely. Tickets for that excursion will be furnished by the Treasurer. It will probably consume the greater part of the day. The expectation is to return to the city late in the afternoon, in time for the members to prepare themselves for the evening exercises, which will be held at this hall.

The directors of the Oxford Club desire to extend to the members of the American Public Health Association the courtesies of the club. The location of the clubs, the libraries, and so on, which have extended privileges to the members, will be found upon that printed list to which I have referred, and which will be furnished to each member by the Treasurer.

The members are also invited to visit the Brooklyn Library, the Pratt Institute, and other places which will be announced.

Here is a communication from Mr. Wm. C. Smith, chairman of the House Committee of the Brooklyn Club, extending the privileges of the club.

Also a communication from the chairman of the House Committee of the Hamilton Club, extending the privileges of the club.

A communication from Mr. C. C. Martin, chief-engineer and superintendent of the New York and Brooklyn bridge, addressed to Dr. Colton, chairman of the Committee on Entertainment, inviting the members to visit and inspect the bridge, the machinery, the method of handling the cars, and whatever may be of interest to them.

A communication from Mr. Frederick Martin, general manager of the Brooklyn Elevated Railroad Company, tendering free transportation. Also a similar offer from the president of the Atlantic Avenue Railroad Company; also from the Brooklyn City & Newton Railroad Company, by the secretary, Mr. Duncan B. Cannon; also from Mr. E. F. Drayton, president of the Coney Island & Brooklyn Railroad Company, and from the president of the Brooklyn City Railroad Company, Mr. Daniel F. Lewis.

These lines cover the entire city of Brooklyn in the western district, that portion in which the members will have occasion to need transportation. The arrangements have been made by the committee so that the badge of the Association will pass members on all the elevated railroads. For what is known as the Atlantic Avenue Lines, of which Mr. Richardson is president, a special pass has been provided, and for all the other railroads members will receive tickets from the Treasurer, which will be honored.

The PRESIDENT.—The next business in order, gentlemen, will be announcements from the Executive Committee. I am sure, before that is given, that I express only what we all feel in saying to the chairman of the committee, and through him to the various institutions and authorities which have tendered the hospitalities of Brooklyn in such a generous way to us, we propose now to tender our thanks. We shall in some more formal way, undoubtedly, express them.

The SECRETARY.—Mr. President, the Executive Committee have no special report to offer this morning, except to announce that during the following days of meeting the Association will meet at 10 o'clock in the morning.

The PRESIDENT.—The election of new members is next in order.

The SECRETARY.—Mr. President, I have here the applications of forty-seven persons for membership in the Association. As all of these applications have been examined and approved by the Executive Committee, I move that the President cast the ballot for their election. These names will appear in the daily papers, so that we need not consume the time by reading them.

This motion was seconded and carried.

The PRESIDENT.—We will consider that the ballot is cast, and I will declare these gentlemen elected as members of the Association.

We come now, gentlemen, to the work of the Association, more particularly, and the first paper this morning is on "The Overshading of our Homes," by William Thornton Parker, M.D., of Newport, R. I. The paper was read by Dr. Lindsley, of New Haven, Conn., at Dr. Parker's request. (See page 36.)

Dr. A. L. GIHON.—There was, perhaps, a special propriety in Dr. Lindsley's reading Dr. Parker's paper, because I hope Dr. Lindsley will give us his opinion of the effect of the shade trees in the city of New Haven upon the health of that city. In Washington we have a Park Commission, which has industriously planted trees, and they have at this time planted about 100,000. Now, it is very well, before this paper goes into print, to talk about the matter, and see whether in planting trees we are sacrificing hygiene to aesthetics, or see whether the aesthetics and the hygiene cannot go very well hand in hand; and as Dr. Lindsley is on the stage, perhaps he can tell us from his own experience, as a member of the State Board of Health of Connecticut, whether the trees in New Haven are in any way responsible for the sickness in New Haven.

Dr. C. A. LINDSLEY.—I had no suspicion that I was asked to read this paper because of my residence in New Haven, having been asked since

I came into the room to read it. I can testify to the suggestion made, that the trees in New Haven are productive of a certain amount of sickness, and that it is realized by a large number of citizens there; but the matter of cutting them down is not even in the power of those who own the property in front of which they stand. It is necessary to get permission from certain officials in order to remove a tree from the street. The sentiment is growing, and I have no doubt will continue to grow until it results in something effective. We must wait and cultivate it until we can reach that point. The fact that the overshading of New Haven is excessive is one that is realized by the better portion of the community, and unquestionably a good deal of sickness has come from it. I will only state this in a general way, and not detain you with statistics.

Dr. HENRY P. WALCOTT, of Cambridge, Mass.—I, for one, should be very unwilling to have the opinion of this Association rest where it apparently would rest—at least the opinion of one member of it—with this paper in this discussion. I spent the larger portion of my life in a town almost as conspicuous as New Haven for its trees. I must confess that I know of no evidence whatever that trees, when properly planted, have been a source of danger. It seems to me that the question ought to be so divided. There is an improper planting of trees, and a proper planting of trees. I do not say that residence among them, but in the vicinity of them, is favorable. While I agree with Dr. Parker that a great many summer resorts have been spoiled by improper planting of trees, I would not admit that the presence of trees, even in large numbers, is any harm in these large cities.

Dr. GEORGE M. STERNBERG, U. S. A.—Mr. President, I wish to make one remark in reference to the planting of trees. It has been generally believed that malarious, damp places are to be reclaimed by the planting of trees, and in many parts of the world where there are exposed malarious swamps, that is one of the means resorted to for the purpose of reclaiming them. I fully appreciate the fact that houses which are overshaded, to which the sun does not have access, are likely to be unhealthful homes; but with the tall elms in New Haven, for example,—those magnificent avenues of elm trees,—that they should interfere with the health of the city, it is difficult for me to understand. Of course, in this matter we all understand that there are extremes. The Western towns, towns in Kansas and New Mexico, exposed to the direct rays of the sun, are almost uninhabitable, and it would be a question whether the fierce blasts of wind sweeping through these sections in the absence of trees, and the powerful effects of the direct rays from the sun, might not do as much harm, perhaps, as the shade-trees. Indeed, in that part of the country the difficulty is to get the shade-trees to grow. I am not disposed to discuss this matter, but simply make the remark that malarial emanations are not favored by the growth of trees. We do not get these malarious emanations in the forests, but in the open, exposed malarious swamps.

Dr. A. L. Gihon.—I would not like to have the idea go abroad that the trees of Washington are the cause of any sickness there whatsoever. I truly believe it to be a fact, that, since the Park Commission took charge of the planting of trees, malarial disease has been materially lessened. I am sorry the health officer of Washington is not here, that he might speak statistically. But it is the common belief that as these trees have grown and lifted above the houses so that there is free ventilation, the people are better off than before; and from my recollection of the health reports of the District of Columbia, I am sure that pronounced malarial diseases are very much less than before the Park Commission undertook this magnificent work, and that the residents of that city would all be disappointed, in a sanitary point of view, if these trees were to be cut down.

Dr. Thomas F. Wood, of Wilmington, N. C.—I suppose the remarks of Prof. Lindsley referred more to the overshading of houses than to the proper shading of houses. In the malarial climate in which I live, on the Cape Fear river, the planters from the rice fields and from all that lower section of the state find that they cannot live on their plantations during the summer-time because of the density of malarial poisoning. The growth of that section is live oak trees and other oaks, with the country very largely denuded of pine trees. In order to obviate that, nearly all of these planters have their homes located in pine forests a little higher up on the sand knolls. The advantage of that is simply this, that in the long leaf pine of North Carolina the foliage is in tufts, and at the tops of long trunks of trees, so that the ventilation is ample beneath the boughs of those trees. We find that not only is it an advantage as far as shade goes, but also in the emanations from the leaves, as we believe. But the disadvantage, we believe, as regards malaria, is in the rank undergrowth, and not from the foliage of the trees. It is due almost entirely to the rank undergrowth. I believe that our dwellings are benefited by the shade-trees; and it certainly would not apply to the South, especially on the sea-coast, that trees properly planted and properly located as to our residences would be a detriment, but would be an advantage.

Dr. C. A. Lindsley.—Mr. President, I fear I will be standing in a wrong light before the audience. I do not wish to be understood as having endorsed in full the sentiments of the paper which I was requested to read. I do not believe to the extent which the author has described that trees are injurious. Again: I do not wish to make a sweeping assertion that the trees in New Haven are so extremely unhealthful as perhaps might be inferred from what I did say. I concede that the trees in New Haven are injurious in this way: the streets in New Haven are very narrow compared with many cities, and the effect is, that the trees being abundant and lining both sides of the street, the shade is too heavy. Then, we have a practice of watering the streets constantly, and the water and moisture in the ground has no opportunity of escaping; at least, it does not get dried up by the action of the sunshine upon it, as it would if it were not shaded. I think the chief disadvantage of excessive shading comes in that way, from keeping the ground too moist. I do not think our houses are particularly overshaded. Most of the houses have some amount of yard around them, except in the more business streets, and there is a free circulation of air. The trees are kept well trimmed up; but the injury comes from this shading of the ground, so that it does not get its proper degree of dryness.

Dr. J. D. PLUNKETT, of Nashville, Tenn.—I, for one, would certainly not like to have this Association endorse *in toto* the paper as read. It is an extreme view by one who has in mind some special location. I do not think, as a rule, that the suggestions he offers are true in my observation. One aspect of the question of shading I think he has not touched upon, and this, to my mind, is of more serious import than the other, and that is the growing evil in this country of tall houses. It is not the house alone that is suffering, but the ground around it. Tall houses are on the increase, and I think it is a subject this Association can well take up and consider. The ground becomes humid and increasingly so, and miasmatic troubles are increased in consequence. I can see how overshading from trees can occur in some localities, with special soil and topography; but I think it does not occur as a rule, and not in the cities and towns of the locality from which I come. This subject is one that has occurred to me time and time again, and I think it deserves the serious consideration of the Association.

Dr. BENJAMIN LEE, of Philadelphia, Penn.—Mr. President, I desire to ask the gentleman from Washington whether this work of tree-planting in Washington is not in the parks and gardens, the trees being planted *en masse* rather than along the streets. It seems to me that in our American cities the danger from overshading is in the trees along the sidewalks. For instance, in the city of Philadelphia, with narrow streets and narrow sidewalks, nearly every house has a tree growing in front of it, at least on the north side, which receives the rays of the sun. Take a city of that kind, and I do believe that the trees planted in that way are an injury to the health of the inhabitants. If you take such a tree-planting as I think exists in Washington to a great extent, the trees being mostly in parks, or if you take such a street as Commonwealth Avenue in Boston, where you have an ample roadway on either side and a grand avenue of trees in the centre of the street, there I think you have tree-planting that is sanitary, and an advantage to the health of the city. But where you have the sidewalks and the houses completely shaded, and the trees often dripping upon the roofs of the houses, there you have a tree-planting which is unsanitary. I believe that any house which receives the drip from trees is an unhealthful house.

Dr. A. L. GIHON.—Dr. Lee appeals to me as the gentleman from Washington. I do not know that I can answer that question in that way, as I am the gentleman from Brooklyn. Drs. Billings and Walsh are here from Washington, but I can say that the Park Commission does not confine itself to planting trees in the parks. They are planted along all the avenues,—with judgment, of course. They are planted at certain specifically appointed distances, and with regard to the character of the tree, the amount of sunlight it gets, and the soil; but the particular point that he wanted information upon, as to whether they are not exclusively planted in the parks,—that is not so there: they are planted all along the sidewalks. I am very glad this discussion is started, and hope it will not be stopped now. We are to determine whether the tree makes the house damp or dry. My own opinion is that the tree dries the house. We know that the *Campagna de Roma* was dried by eucalyptus trees, as were the swamps in California; and I think perhaps there are some members here from Savannah who can bear testimony to the beneficial effects of the beautiful trees there upon the health of the city. In California the eucalyptus trees have dried the tulle swamps and made them habitable.

Dr. G. T. MAXWELL, of Florida.—Mr. President, it seems to me that the argument, as I have caught it from the different speakers, contravenes the facts which are very well known and established. Malarial fever is a disease of the country, and not of cities. As cities are settled and grow, malaria takes its flight into the country. In that respect there is a well defined distinction between yellow and malarial fever, yellow fever being a local disease. As houses are built in cities there is a much greater obstruction to the free circulation of air, and the ground is much more shaded, and malaria passes away. That is true of Europe, Asia, and America, in all cities. The elements which go to produce the malarial germ are there. If heat, moisture, oxygen, air,—if either of these essential elements is removed, malaria disappears as a disease. The fact that cities are exempt from malarial fever is due, therefore, it is supposed, to the covering of the ground by the houses. Washington city, it has been remarked, has enjoyed comparative exemption of recent years. It was attributed in some degree to the trees; but Washington perhaps is the best paved city in the United States. Ancient Rome suffered as no other city or country has suffered from malarial fever. For five centuries they sought the protection of their angry god, and altars were erected to appease the wrath of the gods.

As enlightenment grew, the goddess Hygiea was worshipped. Sickness disappeared, and health took its place; the mountains were tunnelled and aqueducts constructed to bring pure water to the cities. Malarial fever disappeared from Rome itself, and from the infamous *Campagna de Roma*. As those appliances were neglected, the ruins of which are today among the most interesting objects to tourists, sickness again revived where moisture came. To-day they are reëstablishing these appliances, and health will return.

St. Augustine is perhaps as closely built and as thoroughly shaded as any city in the United States. It is known to be the healthiest city in the United States. It was built upon the marsh land; and yet St. Augustine is famous for its healthfulness winter and summer, especially in the summer. So the rule applies, that where you have the ground covered so that the moisture is removed, or access of air is prevented, malaria disappears. I do not believe that trees themselves are the cause of malaria. As the gentleman who is the naval officer says, the eucalyptus tree has been planted for the purpose of drying the soil. It is a tree of rapid growth, takes up moisture quickly and distributes it through the air, and contributes to the healthfulness. This was done in Rome, and what was done there may be done anywhere in America. In the state of Florida I know of but one locality where fever is unknown. It is a sand region, where a well may be dug for forty or fifty feet, passing all the way through white sand. There, on account of the character of the soil, of the great depth of this pure sand, malarial fever is unknown. As I said in the beginning, malarial fever is not the disease of cities, notwithstanding the fact that the atmosphere is much more obstructed in its circulation by the houses than in any forest of trees.

Dr. FREDERICK MONTIZAMBERT, of Quebec, P. Q.—Reference has been made by several speakers to the eucalyptus trees of the *Campagna de Roma*. I was travelling in Italy at one time, and visited a monastery which some twenty or thirty years ago had been closed on account of the malarial disease existing there. It has since been opened, and the monks live there with comparative safety. At first they attributed the result to the eucalyptus tree; but being able to speak the language of the Trappist monks there, they took me further into their confidence, and before leaving they told me pretty frankly that no doubt some effect came from the presence of the eucalyptus trees, but they attributed the change in the healthfulness of the Roman *Campagna* to another source. They told me that at some period of the Christian era, or possibly before, there had been an eruption of some volcano, extinct at that day, which covered the *Campagna* with a layer of ashes. This hardened into a crust, and on that a surface soil was formed. With the primitive methods of agriculture in use in the first centuries of the Christian era, this surface soil had either not been cultivated at all, or in a very poor manner. It had formed a layer which the rain-fall had not been able to penetrate, and these few inches of surface soil held their rain-fall, giving off these malaria conditions. With the advance made in agriculture in recent years, this crust had been broken up, so that the rain is able to penetrate into the lower strata of the ground. In consequence, the giving off of the malarial gases has ceased to occur. To that they attributed more of the effect that has been seen in late years than to the eucalyptus trees.

Dr. JAMES SIMPSON, of California.—In endorsing the remarks relating to California, I wish to say that I am from California myself, and have resided there for twenty-five years. Our climate is different from yours, and in making remarks regarding California I necessarily cannot speak much of your climate. The eucalyptus tree was planted in California in early years under the supposition that it prevented malaria, and from the fact that it was of very rapid growth and afforded protection against the sun. The city of San Francisco, where I live, has a few trees. Almost every tree planted there is quickly removed, because if allowed to grow it would interfere more or less with the rays of the sun shining upon the street and into the houses, and trees are considered more of an injury than a benefit. I speak of shade-trees in San Francisco; but when you come to the valleys of the interior, you find the temperature there in some cases excessive. I have frequently seen it from 113° to 120° Fr. in the Sacramento valley. In those places the eucalpytus is one of the greatest boons they can have. Its advantage as a shade-tree is that it grows very rapidly. In two or three years it will rise to several feet above any building erected. But that is not the only reason why it is valuable: it is for its protection against malaria. In districts where it has been planted it has resulted in almost abolishing malaria, and it has made places habitable which were previously afflicted every year with malarial and intermittent fever, as in Santa Clara and some of the older counties. The eucalpytus tree, growing rapidly, absorbs so much moisture of the soil and the nutritive portion, that you can hardly plant any other tree within the region from which it draws its nutrition without its being destroyed. In some of these places, wishing to plant vines, shrubs, and ornamental trees of various kinds, they cut them down. As time passes along we shall be compelled to plant them again, not so numerously, but to plant them with the single object of preventing malaria.

Dr. J. H. Rauch, of Chicago.—I have noticed that at times there is too much tree-planting. In the course of my official duties I have destroyed trees, and I have noticed that it has been beneficial. The health of the people living in houses became better. I have also found that at times the planting of trees prevented malaria. In many parts of Chicago, just as we trained and planted trees a certain class of diseases disappeared. There is no doubt tree-planting will render a climate more equitable in winter and cooler in summer. You can make a difference by tree-planting. I have no doubt that in New Haven there are frequently houses where they suffer from the effects of tree-planting. The trees are too close together. In the city of Washington there is not so much danger from that because the streets are wide. I have no doubt that the tendency is to plant too many trees. In the neighborhood of Bloomington, Ill., there was a gentleman who had a perfect mania for tree-planting. The streets and roads in that neighborhood are filled with trees, and they have been compelled to cut some of them down. I have within the last ten years directed the thinning out of trees in the neighborhood of houses, in many instances, throughout the state of Illinois. It is simply the extreme of tree-planting. They are planted with no space to grow. In time they become large, and, as a natural consequence, there is overshading and there is too much dampness. Certain classes of diseases make their appearance: trim the trees and the number of cases of that disease has diminished. I am in favor of tree-planting, and would be very sorry to see any of them cut down except when absolutely necessary. There is no doubt that scientific tree-planting within the last twenty-three years, especially since the Park

Commission was inaugurated, has been a benefit, not only from a sanitary point of view, but it has materially changed the climate. Then, again, we have instances where a house has been troubled with malaria after cutting down a forest located near it. It did not suffer from malaria before the forest was cut down, simply because there was a mechanical barrier between it and the neighboring swamp. That is the way trees at times act as preventers of malaria.

Dr. J. N. McCormack, of Bowling Green, Kentucky.—In view of the great length of our programme,—the very large number of papers to be read at this meeting, which have been carefully prepared,—I move that this very interesting discussion be now closed.

The President.—If there is no further discussion now, we will pass to the next subject, but, before doing so, I wish to call the attention of the members of the Association to the rule of discussion, and it will, perhaps, be in some respects convenient if that rule is remembered. The rule is, that after papers have been read, discussion shall follow, and be confined strictly to the papers. Each speaker shall be limited to ten minutes, and shall not speak a second time until every other member who desires shall be heard, and then only five minutes, except by unanimous consent.

The chair will notify gentlemen who desire to speak to send up their names, and they shall be called upon in the order sent up, and he may, at his discretion, limit the time of speaking to five, instead of ten minutes, if in his judgment it may become necessary to do so in order to allow every one on the list an opportunity to be heard.

The next paper on the programme is "Clothing in Its Relation to Hygiene," by James F. Hibberd, M.D., of Richmond, Ind. (See page 94.

Dr. G. T. Kemp, of Brooklyn.—Mr. President and Gentlemen: I would like to express in a few words how heartily I concur in the doctrines set forth in these papers, and would like to state my own experience as a good example of the same. I was a remarkably delicate child, and was subject to the disorders that children are commonly afflicted with. There was never a winter passed over my head that I did not have the croup at least four or five times, with the result that my parents were extraordinarily careful of me, and kept me entirely too warmly clothed. I was raised in that way until I reached the age of fourteen or fifteen, when a boy's opinions sometimes will have a little weight against superior wisdom. From that time I began to regulate my own dress a little more than I had done before, and I am sure that I immediately noticed a great difference in my constitution. I became, as it were, a different boy, and since then I have always enjoyed very much better health. While it has always been my misfortune to be subject to colds, I have never since that time suffered as I did before, and never have I been confined to the house by sickness more than a day or so, while formerly it was a matter of weeks and sometimes months at a time. I have seen others whose experience has been exactly in accordance with my own in this matter. I think this is the place where physicians may very properly step in and advise with reference to the clothing of children. Up to the time I speak of, I was nearly always dressed warmly in flannels. I began wearing thinner underclothes. I would not recommend any one, unless he has the same constitution, to dress as coolly as I do. In severe weather I wear a thin undershirt of gauze, in the summer none at all. It is rarely that I suffer from more than an ordinary cold. Nearly all my bad colds I catch by kicking the covering off at night, finding the clothes too warm. In connection with this same case let me state that we had in our family a uric acid diathesis. I have a brother who is compelled to dress warmly. If he dressed as I do, he would be a great sufferer by it. Here are two men in the same family, having had very much the same history, but yet totally different; and I wish to endorse heartily every remark the doctor made as to noticing carefully the disposition of the individual for whom the clothing is to be regulated, and, above all, to avoid this tendency we see of dressing too warmly. Children should be allowed to have their feelings brought into the matter, as the feelings of the individual are often the best guide to nature.

The PRESIDENT.—Would any other gentlemen like to address the meeting? The next exercise on the programme is for a fixed hour. We have about fifteen minutes before that time comes, so that if any gentleman desires to speak he has ample time.

Dr. J. D. PLUNKET, of Nashville, Tenn.—Mr. President, there are any number of gentlemen present who, like myself, have not seen the Treasurer yet, and I move that we adjourn to spend fifteen minutes in that pleasant duty.

This motion was seconded.

The SECRETARY.—Mr. President, I would say that Dr. Bell proposes to be here in about fifteen minutes to make an address to the members prior to going over to the Health Exhibit, and if we adjourn it would be doubtful about getting the members back in time.

The PRESIDENT.—Before any of the gentlemen leave the room, I am glad to announce that a meeting of the "Committee for the Disposal of Garbage" will be held in the ante-room to the right of this room at 12 o'clock.

At this point Dr. Bell entered the room.

The PRESIDENT.—In connection with the formal opening of the Sanitary Exhibition, an address will now be made by Dr. Bell, of Brooklyn.

Dr. A. N. BELL, of Brooklyn.—Mr. President and Gentlemen: To designate a five minutes speech as an address is rather far-fetched. I have no address to make. I have only to say that with the aid of these other gentlemen we have collected together this year an exhibit of various articles, many of which are of the kind decidedly promotive to health. While we have good things, I am confident that we have nothing bad or indifferent. It is hard to draw a sharp line as to the goods we would or would not receive. The most decided measure we adopted was to admit no pharmaceutical preparations—those that are put up as prescriptions and the like. We have proprietary articles, disinfectants, antiseptic plasters, and things of that kind, which take up a great deal of room. We have clothing, as you will all see, worthy of your attention. And we also have some things which, I am sorry to say, are not yet in position. I would rather leave all these things to speak for themselves, to challenge your examination, your criticism, and your appreciation, for what they are worth, not on my judgment, but on your own. I have, indeed, to say to you, that, it being the first effort of the kind in this country, it was a novelty for many persons. During the the last week of our effort, many applications have had to be rejected. Four or five have been received to-day. We could not give them all space, because the kind of space they wish is not there, and that which we had to dispose of is not suitable for their needs. I think, however, that that which at first appeared the least desirable will attract your attention more than that which they readily jumped at as being the most desirable: I refer to those substantial improvements which, as I said, I would rather leave to your own judgments than to express any opinion of my own. That is the end of my address, gentlemen.

A motion was made and duly seconded to adjourn to the Sanitary Exhibition.

The PRESIDENT.—The motion is made to adjourn to the Sanitary Exhibition. I beg to remind you that the afternoon session will be held at 3 o'clock, in this hall.

Before leaving the hall a motion was made, duly seconded, and carried, tendering a vote of thanks to Dr. Bell.

AFTERNOON SESSION—3 O'CLOCK P. M.

President Johnson in the chair.

The PRESIDENT.—The Association will come to order.

The Local Secretary, Dr. Raymond, has some announcements to make.

Dr. J. H. RAYMOND.—The members are cordially invited to visit the rooms of the Brooklyn Y. M. C. A.

I would like to repeat a request made this morning, that the members of the Association, when they come to the Academy of Music to-night, have their badges of membership conspicuously displayed. The ushers have received instructions to escort the members of the Association to specially reserved seats. We are very desirous of having them all together, and, in order that the ushers may be able to do that, I would ask that these badges be displayed.

The PRESIDENT.—The first paper this afternoon is on the "Causes and Prevention of Infant Mortality," by Jerome Walker, M.D., of Brooklyn, N. Y. (See page 73.)

The PRESIDENT.—The next paper, gentlemen, is upon a subject somewhat allied to that which has just been read, and it would, perhaps, be as well that, before entering upon the discussion of this very valuable paper, we hear the second one, and then they can both be discussed together. If that be your pleasure, we will do so; if any one objects, we will put it to vote. The title of the paper is "The Dwellings of the Laboring Classes in their Relation to Infant Mortality," by Alfred T. White, C. E., of Brooklyn, N. Y. (See page 69.)

The PRESIDENT.—These two papers to which you have listened are now before you for discussion. They certainly deserve careful consideration, as they deal with one of the most weighty and important problems connected with public health.

Dr. JAS. F. HIBBERD.—I think no one can deny or question the statement of results in the last paper, or in the preceding paper, but I would like to ask whether the figures given are not generally the result of a better class of inhabitants, so far as sobriety is concerned? Do not these improved dwellings draw upon people who are more sober? Do not the drunken and shiftless people draw into lower places? Of course, we find a greater infant mortality where the mother is a drunkard as well as the father. I should say that unquestionably there is a lower scale of population of human being in London, and everywhere else, than in these improved dwellings, and, so far as my own judgment goes, I am willing to say that I think there are twice as many people who are more intelligent and better read, and who ought to know better how to take care of themselves, among the inhabitants of those dwellings, than there are of the poorer or more ignorant class, who know less how to take care of themselves. I do not see any other way to average them. They are a very fair average of the whole community. Of course, that is only an individual judgment, in which some one else might come to a different conclusion. They go all the way from the ranks of laborers to ill paid clerks. Here in Brooklyn fifteen per cent. of the tenants are very poor. Some of them are widows without husbands, who have to go out washing by the day, and it goes without saying that none of these people are grossly intemperate. Very few of them are intemperate at all, and certainly, in a great many cases, you will find that they are total abstainers.

Dr. FRANKLIN STAPLES, of Winona, Minn.—I have one or two suggestions on the question of the first paper upon infant mortality in institutions. We have, I think, frequently overlooked in these institutions proper care as to the ventilation of rooms, and as to the use of disinfectants. To illustrate: At one time, when I was on duty in an institution in this city, an epidemic of measles was in progress. I think there were thirteen cases a day. I had an idea that by the proper use of disinfectants we could control the epidemic. I began the daily use of chlorine to disinfect the rooms in which the children were kept. The epidemic was so universal throughout the house that isolation was neglected, because all of the rooms in which the children were kept were continually furnishing patients, and it was impossible to furnish room enough to isolate a case. I began to have the children removed from the room in which the case originated. In the morning we used dilute muriatic acid and bleaching paper. The room was kept closed for half an hour or an hour. It was then ventilated and the children put back. In less than three days there was evidence of an abatement of the epidemic; after six days no new cases appeared, although several of the children were exposed in those rooms. In cases of diarrhoeal troubles in these institutions, I have repeatedly seen the disease communicated from one child to several others that were associated with this one in the same room. I adopted a similar plan here—to disinfect the rooms and remove the children that were so affected. I found that it had a very important influence—not absolute, but a very important influence—in checking the disease.

Another precaution that may be taken in these institutions to prevent infant mortality, especially in very young babes, is the care to see that proper food is furnished. I do not know whether that subject was touched upon in the papers or not, as I came in a little late; but one or two things in regard to the care of milk occur to me. By observing these points, and overcoming them, I have been able, I think, to reduce to a minimum the trouble from nursing. One point is to secure the milk from the country, and not from stall-fed cows. Secure the milk from cows running on pasture land, and without agitation, as much as possible, to prevent the churning process which almost always causes trouble in large cities. The milk is half churned before it reaches the dwelling. In those cases, I selected a dairy by personal visitation, one that was cleanly and well kept. I had the milk from the afternoon's milking, and had it delivered as early as possible the next morning to the nursery by hand. The only agitation that the milk received was agitation on the train, and the agitation of carrying it by hand to the nursery. The quantity used was delivered in that way. A very marked improvement was noted in a short time, owing to this care. Since that, I have adopted, in addition to that, sterilizing, or partially sterilizing, the milk, with a still further improvement in that respect. I offer these suggestions as some that, in my opinion, will prove of value.

A MEMBER.—In connection with these remarks, I would like to ask what effect have wet brewers' grains upon the dairies? Let some gentleman take this up at some future time, and make an analysis of it, if he is not already acquainted with it, with a view to ascertaining by investigation how far we are using this impure milk.

A MEMBER.—I can answer that, by saying that at the New York State Experimental Station analysis showed that milk from cows fed entirely upon brewers' grains, in and about New York and Brooklyn, is invariably acid, and that the globules are somewhat smaller, apparently, under the microscope; that the proportion of albuminoids to fat is slightly disturbed in favor of a slight increase of the albuminoids. Where brewers' grains are fed with other food, any changes that might be produced by brewers' grains are somewhat hidden by the other food.

Dr. JEROME WALKER.—Several years ago I made a series of experiments, which I think have never been followed up by any one since.

Taking samples of milk from various sources,—for instance, first, drawing the best specimens of milk from cows fed at Prospect park, where they are fed as country cows are fed; then from a distillery, where they are fed upon ordinary grain; then from a shanty stable in the outskirts of the city, where they are fed upon garbage; then going into the poorer parts of the city where "absolutely pure milk" is sold at three cents a quart; and then, taking a sample of the milk from one or more of our reliable milk dealers, which took twenty-four to forty-eight hours from the cows to the consumers; and, finally, taking a sample of the milk from cows fed upon distillery slops, and subjecting all these samples to the same tests. The details I do not remember now; but one fact connected with the grains I remember: they are considered stimulating to the cows by the farmers. These specimens of milk were handled in exactly the same way, under the same conditions of temperature, and delivered in the same way. It was found that all the specimens of milk from cows fed upon these grains putrefied; and in the course of a number of days—I do not remember how many now—maggots appeared, and they did not appear in the other specimens of milk. This milk putrefied without in any way going through fermentation, so far as I could find out. The milk which passed the best test was from the cows at Prospect park, and the poorest testing milk, that which actually putrefied without fermentation, was that from cows fed upon grains.

Dr. Dunnavant, of Osceola, Kansas.—Mr. President, I want to ask about the milk from cows fed upon grains and upon the refuse from glucose works.

Dr. G. C. Ashmun, of Cleveland, Ohio.—Mr. President, in regard to the question of milk from cows fed upon grains and upon refuse from glucose works, I have had some experience and observations that would show that whenever the brewers' grains and refuse from glucose works have begun to undergo decomposition, the effect of this upon the milk is very different from that which is fed fresh. I think it is true, as the gentleman remarked, that it is clearly shown that at a different temperature milk will not keep when cows are fed upon decomposing fluid grains or refuse from glucose works. Milk undergoes a rapid decomposition, and subjected to such influences it will keep only about one half the usual length of time before it becomes decomposed. The fact is that almost all the grains are put into the same receptacles for transportation which have been used before, and so fermentation is set up rapidly, decomposition occurs immediately, and the trouble has been produced.

Dr. G. T. Maxwell.—I have nothing to say in regard to these papers that have just been read that is not in the highest degree commendatory. I think the profession owe their authors a debt of gratitude. I do not rise to discuss them, but to ask certain questions for information, which I think perhaps may suggest inquiries in a direction which seems to have been in a degree overlooked. I would like to ask of those gentlemen why it is that cholera infantum is a comparatively rare disease in the South, and a common and fatal disease in the North. In 10,000 inhabitants, the deaths from cholera infantum in St. Augustine are 5, New Orleans 17, Boston 25, and Chicago 30. It seems to me that that suggests quite an interesting and important point of investigation.

Another question which I would like to ask is: Why is it that cholera infantum reaches its maximum of deaths in the month of July, and falls suddenly and greatly in the month of August, which is not a hotter month, and which is not a cooler month? The fact, I think, is just as I have stated it, that the decrease in mortality is prompt and great as soon as August comes in.

Another question I would like to ask is this: Why is it that cholera infantum is just as common and just as fatal in the small towns and villages and on the farms in the Middle States, as in the large cities? That last question is made from observations, for which I have had peculiar opportunities. I have practised medicine twenty-three years in the state of Florida, when I moved into the state of Delaware. I found that I knew practically nothing of cholera infantum. In a three months practice in a town of one thousand inhabitants, in the midst of the most highly improved farming country, and of beautiful peach orchards, I saw a larger number of cases of cholera infantum than I had seen in twenty-three years in the state of Florida. In the year 1873 or 1874, there were, in the little town of New Castle, then containing about two thousand inhabitants, forty-one interments from cholera infantum. After spending nine years in Delaware, I returned to Florida, where I spent six years in the city of Ocala, a place then of about the size of New Castle. During that time I never heard of a single case of cholera infantum. It seems to me that these are interesting facts, and I would be very glad if the gentlemen who are investigating the subjects would give their attention to these points.

Dr. C. D. McDonald, of Kansas City, Mo.—There is one fact that has always impressed itself upon my mind with regard to cholera infantum. That is, that it does not depend so much upon heat, when that heat is uniform and continuous, as it does upon transition from heat to cold. As the gentleman from Florida has spoken of the favorable report on cholera infantum in the South, I would like to say that I imagine that it depends on the heat being continuous, and not so excessive as we have had in some of our Northern states.

Another statement in regard to the deaths from cholera infantum is, that a great many deaths come from a well-to-do class of laborers, or wage-workers. There is another class in which cholera infantum prevails, and that is in the families of the wealthy, who spend too much of their time in following after the demands of fashion, and leave their young children to the care of ignorant nurses. The laboring man goes to work at six or seven in the morning. His wife does her own work. The baby is kept in the cradle, too often at a distance below the surface, where it cannot catch the fresh air. The child will get restless, and fret. The mother will go and shake the cradle, and sing to it. As the child sways to and fro, the stationary objects on the wall pass back and forth before its eyes until it produces a sort of intoxication, and it finally goes to sleep from this intoxication; and while she is attending to her duties of the day she keeps this child asleep in this hot, sweltering cradle. I mean now in the hot season, when the temperature is above 80°, say from 80° to 90°, she keeps it asleep by rocking it and singing to it. You can tell how much good that does. The child will look at one object while it lies idle: it fixes its eye upon some one point. She agitates him until she gets the child drunken, and then it goes to sleep, and sleeps off that drunken sleep. But the point is here: When the father comes home in the evening, he goes to the cradle with his coat thrown off, and, perchance, his sleeves rolled up, after he has washed himself, and is fixed to enjoy himself for a short time before the time for retiring has arrived. He takes the child out of the cradle, and takes him, perhaps, around the house into the shade, and dandles him on his knee. He talks with him and plays with him. There, Gentlemen of the Association, is the great transition from that hot, sweltering cradle to the cooling air that surrounds the house where the father takes the child. The parents do not realize it. The transition has not occurred to the parents, but it has to the child. The child becomes pretty well chilled. That night, very likely, between the hours of 12 and 2 o'clock, as my observations have shown, the mother will be nursing the child, when suddenly it begins to vomit. This is followed by a diarrhœa, then a watery discharge, which in a short time will run into collapse. There is cholera infantum entirely different in pathology from what we looked for in ordinary diarrhœa. It has its origin in the nerve centres, and it does not depend upon the indigestion of the food, but it is caused by the sudden transition from heat to cold, although in the warm season this transition is very great to the baby.

Dr. Pinckney Thompson, of Henderson, Ky.—I would like to hear from the gentleman from Florida what the treatment is in Florida; and also, whether they nurse from the mothers.

Dr. Maxwell.—On cows' milk.

Dr. Thompson.—Is not cows' milk scarce in Florida in a great many places?

Dr. Maxwell.—When there is a scarcity of fresh milk, they use condensed milk.

Dr. Thompson.—I am not one of the men who believe especially, as far as cholera infantum is concerned, that it is ever produced by heat, or by anything else than indigestion of food through a microbe of some sort; and I think it generally gets that from the milk. It is the exception to the rule in any country for a well preserved woman who is healthy, does not get over-heated, and who knows how to control her temper, and has plenty of milk, and has a child, for that child to have cholera infantum. Where you find a woman nervous and unhealthy, and who probably has to do her own work, who frequently becomes over-heated, you will find the children sometimes having cholera infantum. From what I have been able to gather, I imagine that cholera infantum in large cities, and especially in such cities as this, is produced nine times out of ten by the milk. Milk is the chief thing fed. Dr. Walker, I think, states that it is impossible to get milk from a cow and carry it any distance without its being tainted by microbes, which produce fermentation. These cannot be removed except by heat. I have made a few experiments in the last two or three years in having the milk for bottle-fed children heated, not quite to the boiling-point, but a little over 100°, and put into a self-feeding pan, and then making it as cold as you please. Milk should never be fed except from that pan, and the can should be so constructed as not to permit the atmosphere to disturb the contents. I am not one of the men who believe that milk is the only food necessary for the preservation of children. I am quite sure that I have cured numerous cases of what we call summer diarrhœa by simply suspending the milk entirely, and feeding broth, such as mutton and chicken. I am not mistaken in that, I am sure; and I think Dr. ———, of New York, takes the same ground, that cholera infantum is not produced by heat alone, although it is one of the factors, but it is produced by the food usually given to the children, whose digestive apparatus is incapable of overcoming it. I believe that very young infants ought never to be fed with milk that has not been sterilized in some way, either by heat, or by something else that would destroy the microbe. I believe that children should not be fed milk taken promiscuously from a dairy. I have known families in Kentucky to raise as many as eight or ten children; but they were always careful never to feed any but milk from one cow. It takes a healthy cow to give healthy milk. I do not believe that any cow gives good milk if fed on kitchen slops, etc. I only wonder that it is ever fed to them when you have rye, barley, corn-meal, and everything else that is good.

Another point: First, I have seen children raised by hand, and fed with milk from cows running in as pretty a country of blue-grass as you ever saw, and they were suffering from this diarrhœa called cholera infantum. Take that cow up and feed her dry food, such as oats and wheat bran, and it will cure the child. The milk should be milked into something from which you can keep the atmosphere. All this milk in buckets exposed to the atmosphere is poisonous to every child that drinks it.

Dr. Byron Stanton, of Cincinnati, Ohio.—If the temperature goes to 60° or below at night, cholera infantum is not likely to prevail; and, if you study the statistics of cities where the disease is prevalent, you will find that when the night temperature gets down to 60° or below, the disease suddenly disappears. I think one reason why the disease is more prevalent in the interior is that the mean temperature of the interior is greater, and the night temperature is generally lower than it is elsewhere. I do not believe that cholera infantum is a disease altogether produced by indigestion, although I believe that indigestion in some measure does produce the disease. It is caused by the nervous system being prostrated; it is not so much from changes of food itself as it is changes in the condition of the child. I am inclined to favor the opinion of the gentleman who just sat down. I think that the principal causes of cholera infantum are extreme atmospheric changes. They produce a change also in the food, particularly in the milk given to the children. I think the death-rate, which is produced in different localities, can be attributed principally to the different changes in the atmosphere. For instance, we have in Chicago at times a large death-rate from cholera infantum, principally confined to one or two months in the summer. I think these sudden changes are the principal causes of cholera infantum. It is not very prevalent in any of the spring or winter months, but is confined to one or two summer months, July or August, or June. Consequently, I believe it to be due to a combination of causes. The food that we feed the child is affected by the extreme heat, and the child is also affected by the extreme heat.

Dr. Edward Clark, of Buffalo, N. Y.—The question of the causation of cholera infantum, or summer diarrhœa of children, is a subject I do not intend to say very much about; but in our city of Buffalo we have, unfortunately, in some portions of the city a very large death-rate from cholera infantum, perhaps larger than any other city in the country. My experience, and my observation and study in the city of Buffalo, lead me to believe that the most prolific factor in the causation of cholera infantum is injudicious feeding, particularly the use of poor milk. We have on the east side of our city about 30,000 Polish people, together with a very large number of Germans, and, unfortunately, the common council in our city allows almost any one to have a license to peddle milk, if he has a place to keep a cow. Many of these German people keep two or three or more cows, and peddle the milk. Many of the cows are kept under the most unfavorable circumstances, and are fed upon grains. I have had occasion to go into the stables, and found the grain swarming with maggots. They do not feed the distillery slops because the ordinance prohibits that, but it is in these localities that we have the cholera infantum. It is the hot weather that produces this. Five tenths of all the cases in Buffalo occur in this locality. I believe that milk very readily decomposes in hot weather, and that it begins to decompose before they feed it: as soon as it gets into the warm cellar fermentation is set up, and the result is that we have cholera infantum. As regards the milking of the cows, and the manner of distributing the milk, I visited the largest stock-farms near Buffalo. They had sixty head of Holstein cows. You do not see a drop of milk until it is taken from the cooling-pan to bottle. In milking the cows there is an arrangement which fits over the cow's udder, and the cow's milk is run down into the pan, and you do not see the milk. It is then poured into properly covered cans, resting in ice-water, and, when thoroughly cooled, it is poured into bottles and kept on ice until it is delivered. I believe that if we want to diminish the deaths from cholera infantum in our large cities, the first thing to strike at is the milk question—the milking of cows and the distributing and delivering of the milk. Of course the hot weather has more or less to do with aggravating the case. In the hot days and the cool nights the children kick the bed-clothes off. What is the result? The surface of the body is chilled, and the interior of the body, with its contents and intestinal canal heated up by the temperature of the child's body, aids decomposition. The best thing is to stop the milk absolutely, stop it entirely. Give the child a thorough physicking. Give it egg albumen and beef juices.

Dr. Edward Playter, of Ottawa, Canada.—If we give opinions too long, we will not arrive at a conclusion. I have been very much pleased with the action taken by the American Medical Association on the importance of children's food, and the committees and reports of those committees; and I have often thought that if this Association could take some action to aid the efforts of the Medical Association, it would be very desirable. I agree with the last speaker and one or two others in regard to the diet. It seems to me that the diet is the main thing. There are many mothers who cannot supply milk, and if we cannot induce the mothers to feed themselves properly in order to be able to supply the infant, the next best thing for us to do is to have the milk fresh and properly served. It is universally decided, and by the American Medical Association especially, that cows' milk and goats' milk, properly diluted, are the next best things. As regards the vessels which contain the milk, that is also very important, and I have been led to conceive of a cup instead of a bottle, which I would like to place on exhibition in the Sanitary Exhibit. There is no space there. I have not been around there yet, but I have some funnels here with me which I believe have not been brought very much to the attention of the public. I also had a wax model of a cup, which could be easily cleaned. I would suggest that a committee be appointed to take some action upon this very important question. I had hoped that more time would be given to the consideration of this question by the Association. I think, if it were possible to take some action toward aiding the American Medical Association, that something very definite and profitable might be arrived at. Looking toward the education of mothers in reference to the preparation of food, I think that some instructions might be sent out as to the best form of diluting milk, those most generally recognized by the American Medical Association. I think that the results of a committee appointed by these two associations would be of very great value. I will leave the cup and some of the bottles in the exhibition.

Dr. Jerome Walker.—I will not detain the meeting more than a minute or two. When I read my paper I appreciated very fully that I had a large ground to go over, and of course I could not go into details as I might have done if I had taken up one individual branch of the subject. While my experience has been considerable upon this whole subject, I think that any one individual branch of the subject would occupy more than half an hour. It seems to me that the grounds I take in regard to the generalization of the whole subject are the proper grounds to take in regard to this whole matter of cholera infantum. I think it is a mistake for individual observers to contend that a certain thing is the cause of cholera infantum. That has been distinctly brought out to-day. Each man has a specific cause. So far as I can learn by study, the causes are many; therefore I think it is a mistake to dwell too much upon any one cause. While artificial feeding may be the cause in a number of cases, still many physicians have been called in to a number of cases where the mothers nurse them splendidly: so that it is a question whether there is not a special condition, which is the direct cause of cholera infantum, brought on by special circumstances. As physicians, we should tell people whom we come in contact with, that there are many causes of disease, and we should point out to them, if we can, these causes in detail, and show them how, by observing or taking cognizance of a large number of these causes, infant mortality can be decreased.

The PRESIDENT.—The next subject announced is by Dr. Homan, of St. Louis, and is on the "Compensation of Health Board Officers." (See page 53.)

Dr. JAS. F. HIBBERD.—Mr. President, a few words to open this discussion: I should be inclined to look at the compensation of health officers from quite a different stand-point than that presented by Dr. Homan. It seems to me that we should regulate it by the labor that we have to perform, and not by the number of people that we have to do for. There may be, in a population of 100,000, four times as much sanitary work to be done by the executive members of the health board as there would be in another city of twice that population, or another district, wherever it may be, whether cities or municipalities. If we had taxed the people who were desirous of our services at so much per capita, it seems to me that it is leaving out of consideration the essential thing that the health officer ought to observe, that is, how much work he has to do, and what is the nature of that work which he puts himself under obligations to do. It happens to me to have some forty odd thousand of people under my care in this direction. If they were taxed a cent a year for my compensation, I would get about $400 a year, and if I am to give my time to looking after these 40,000 people for $400 a year, I should have to beg my own living, to say nothing of my wife and babies. Four hundred dollars a year would only enable me to live in a very moderate way for a month or two, at the best. I think, therefore, that while the number of the population is worthy of consideration, the per capita expense should not enter into the question in this matter of compensation, but that we must take into consideration the kind of work we have to do, and what is the nature of that work.

Dr. J. F. KENNEDY.—The consideration of this matter is one of considerable interest. There is no objection to any place making the compensation as great as it sees fit. I think we should simply suggest the minimum.

Dr. A. W. CANTWELL, of Davenport, Iowa.—Mr. President, the salary of the health officer, I think, should be regulated a great deal by his position. I served on the health board for ten years for nothing: finally we got a law passed allowing us $300 a year. Previous to that year an epidemic of small-pox broke out, and we had a very large number of cases. In a short time my practice dropped off, and I had a family to support. This $25 was no kind of a compensation. The city immediately said that they would compensate me for my trouble, and during the balance of that time I drew $10 a day. I think this is the only way we can adjust our compensation. I do not think we should set any figure, for we cannot tell what may come up; but I think the officers should have a fair compensation. I think the chief officer of the state board of health should draw a fair salary, but that the local officers should not have any such salary.

The PRESIDENT.—I would remind the audience that the meeting to-night is at the Academy of Music, and it is desirable that we be punctual, as there are to be a number of addresses. We will now adjourn to meet to-morrow morning at 9 o'clock, if that be your pleasure.

EVENING SESSION.—8 O'CLOCK P. M.

The following programme was carried out:

Calling meeting to order, by J. H. Raymond, M. D., chairman local Committee of Arrangements. (See page 20.)

The Address of Welcome, on behalf of the city, by Hon. Alfred C. Chapin, mayor. (See page 21.)

The Address of Welcome, on behalf of the medical profession, by Alex. Hutchins, M. D. (See page 25.)

The President's Address, by Prof. Hosmer A. Johnson, M. D., of Chicago, Ill. (See page 1.)

Addresses were also made by the Rev. Richard S. Storrs, D. D., (see page 32), and Hon. Seth Low (see page 29).

Music was furnished by the Twenty-Third Regiment Band, under the leadership of Professor Alfred D. Fohs.

SECOND DAY.

Wednesday, October 23, 1889.

MORNING SESSION.—9 O'CLOCK, A. M.

The meeting was called to order by the President.

The Treasurer's report was then read.

The names of new members, recommended by the Executive Committee for election, were presented, and, upon motion, duly seconded and carried; the Secretary cast the ballot in favor of their election, and they were declared elected.

The roll of the Advisory Council was called, and vacancies filled. The council was requested to meet Thursday morning at 10 o'clock.

The next in order was a paper on "The United States Census in its Relation to Sanitation," by Dr. John S. Billings, U. S. A., of Washington, D. C. (See page 43.)

Dr. C. A. LINDSLEY, of New Haven, Conn.—I would like to ask Dr. Billings what limit is made, or if the number of cities included in this census as having special investigation is limited.

Dr. BILLINGS.—I would say that it is absolutely limited to sixteen. I started with the idea of having a dozen large cities, but it may go to twenty-four.

Dr. LINDSLEY.—Is New Haven included in those figures?

Dr. BILLINGS.—It is not.

Dr. LINDSLEY.—I should be very glad if it could be. In our city some of our best citizens and some of our worst live in the same ward.

Dr. BILLINGS.—If Dr. Lindsley will forward a map of the city of New Haven, with the divisions which would be properly marked, I will have it arranged.

Dr. G. C. ASHMUN.—I want to ask a question in regard to this matter. Located in all our cities are lying-in institutions, in which, for one reason or another, the names and residences of most of the women are not given. I should like to know whether the enumerators will gather the statistics of such institutions accurately, or whether compulsion will be used to secure definite information from such institutions, or whether the local officers are expected to furnish the information for such places. We have at least three such institutions in cities having health officers, and I know of some in other places. Our cases go to them, and their cases come to us. These cases are shielded from public observation as much as possible. It is a point in some institutions to shield them if possible, and names and residences are concealed. Now, shall we bring those out or not?

Dr. BILLINGS.—Shall I answer the question immediately, Mr. President? or shall I wait for further discussion?

The PRESIDENT.—It will be, perhaps, a little saving of time, if any other gentlemen have questions to ask, for them to ask them now, and let Dr. Billings inform us all at once. Are there any further remarks upon this question?

Dr. G. P. CONN, of Concord, N. H.—I would like to inquire of Dr. Billings how he expects to get at the distinction between colored people: whether the physician is expected to make that report, or whether the enumerator; and if the enumerator is to be the judge of it, whether it is an octoroon, quadroon, mulatto, or full-blooded colored person. How are you to get at that so as to make it in any way reliable?

Dr. LUCIEN F. SALOMON, of New Orleans, La.—I might save Dr. Billings the trouble of answering that question, by stating that we have arranged in New Orleans to send circulars to all the physicians and public institutions, requesting that in making out these certificates, making out death certificates, they would state the color of the deceased; and we have no trouble now. Death certificates now coming in, state whether they are octoroon, quadroon, mulatto, or full-blooded negroes. There will be no difficulty about that.

Dr. CONN.—That I understand to be the opinion of a physician.

Dr. J. N. McCormack, of Bowling Green, Ky.—I would like to ask Dr. Billings in regard to smaller cities and town, where records of deaths and births are kept, referring more particularly to the position existing in my own state. In very many of the smaller cities and towns these records are inaccurately kept for such places. But, according to my information, the workmen to whom we must look for the accuracy of these reports—physicians who are practising in the country districts—had not been supplied with registers, because they were living in cities where registers were kept; and it seems to me there would be a very material defect in reports in consequence of this overlooking of these men who are practising in country districts. In my state this is particularly marked.

The President.—Is there any further discussion of this topic, gentlemen? If not, it will be in order for Dr. Billings to close the discussion.

Dr. Billings.—Mr. President, referring to the first question, in regard to deaths in institutions, I would say that death occurring in those institutions can only be credited to the hospital and to the district in which they occur. Of course they cannot be attributed to any other ward or district in the city. The enumerators, on the day of taking the census, the first day of June, take whatever name is given them. It makes no difference to them whether it is a true name or a false name. The object of getting the name in the census is to prevent duplication of individuals, and they take the name which represents the person actually in the institution at the time. Of course you will all understand that that does not in the least represent the number of persons who have gone through the institution in the year, and has no definite relation to the number of deaths in the institution during the year. In dealing with the mortality of an institution, such as a hospital, we have to canvass in an entirely different way to get at the death-rate there than we do to get at the rate of a fixed population. I do not think there is any necessity of bringing out the names, but I do think it highly important that there should be a record given of every death occurring in institutions of this kind. In some institutions, for one hundred children born ninety die during the year. In such a case as that, it fixes public attention upon what is a plague-spot on the community.

With regard to the second question: I do not suppose that it is possible to make the fine distinctions scientifically of the half, quarter, or eighth extractions. But they are signified by the terms octoroon, quadroon, mulatto. Attempts would be made to get them by these enumerators, because the law for the census specifically prescribes that it shall be done; and the enumerators would take whatever a person tells them. They also enumerate, or make a rough judgment simply by the color. In regard to the death, the matter is arranged as Dr. Salomon has pointed out. I do not expect to be able to get the death-rate for a large part of the country; but I expect to get it in enough of the larger cities and in one of our Southern states sufficiently complete to enable us to make comparison between the death-rates not only of the white, black, and mixed blood, but also in certain forms of diseases. The one state I allude to is the state of Alabama, in which the entire medical association of the state, and Dr. Cochran, vice-president of this Association and state health officer, are endeavoring to make a complete record of births and deaths throughout the state for the year. I hope to place that in comparison with three or four of our Northern states—Massachusetts, New Hampshire, Vermont, Connecticut, and New York—with the exception of a few counties, which have not a complete registry to make results reliable.

As regards not sending registers to physicians living in cities where there is a registry of death, and who practise in the country districts,—that was not done because I have no hope, even with the help of physicians, of our taking absolute registration where there is no registration law enforced. The physicians themselves in those cities, while a very large number of them are very kind and very willing to do anything, object, and some of them object very positively, to furnishing a certificate of death—one to the city in which they live, and one to be furnished to the United States census. So it was not thought worth while to trouble physicians in states where there is no registration law.

I hope the result of the compilation of this next census will be such as to demonstrate the effect and utility of the registration of death and of a special registration of doctors' certificates, not merely in the large cities, but throughout the whole country, in rural districts and in every village and town. In New York, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, it is now fully and amply shown that there is no difficulty in obtaining the registration of death throughout the country, with the requirements of a burial permit to be given from a central office before the burial is allowed. This is a requirement which is perfectly practicable, and can be carried out in the country districts quite as well as in large cities. I do not say to the members of this Association that this requiring of a burial permit is a *sine qua non* of an accurate registration of death.

Prof. W. H. Brewer, of New Haven, Conn.—Mr. President, it seems to me that in giving the statistics of mixed blood, the same effort should be made to inquire into the parentage that is made in other races. I believe it is a law of nature, as it has been and is demonstrated in the lower animals, and also by somewhat extensive inquiries regarding man, that the first cross between the different races has more stamina and vigor than the descendants of such cross: that is, where mixed bloods intermarry they are more liable to disease. Therefore, I think it is very important that the parentage of the mixed blood, so far as possible, should be inquired into. I am aware that it cannot be made complete, but that an exceedingly important series of facts may be brought out in that way. I should like to see that brought out as far as possible.

The President.—The next paper in order is upon the "Prevention of Phthisis Pulmonalis," by Dr. Ezra M. Hunt. [See page 136.]

Dr. J. N. McCormack, of Kentucky.—I want to offer a resolution, which shall go upon the records of the Association when adopted under the rules:

WHEREAS, in view of the rapidly increasing travel and commercial intercourse between this country and Mexico and Cuba, and the consequent growing importance of the establishing and cultivating the most friendly relations between the health authorities of our own and those of the countries above named, that a cordial invitation be extended to the sanitary authorities of Mexico and Cuba to send representatives to the future meetings of this Association, and that the secretary be instructed to open correspondence with these authorities, looking to this end.

[See final disposition of this resolution Friday morning.]

The PRESIDENT.—The resolution, gentlemen, according to the rules, will be received and forwarded to the Advisory Council, who will report it back for action.

Dr. HUNT then read the paper announced.

The CHAIRMAN (Dr. Montizambert).—Gentlemen, this paper and its subject-matter are now before you for discussion.

Dr. P. H. BRYCE, of Toronto, Canada.—In view of the fact that this Association assumes to promote public health interests, not only in the United States, but also in those countries adjoining the United States; and, inasmuch as Canada, with its various monarchies, has representatives in the membership and council of this Association, it is hereby

Resolved, That this Association direct its Secretary to correspond with the government of the United States, requesting them to communicate with the government of Canada, with a view of having the next Health Census of these countries placed upon the same principles, and let the same forms be adopted by Canada, as those now drawn up for the next census to be taken in 1890 by the United States, in order that a comparative study may be made of death- and birth-rates, and also of sanitary conditions which prevail in Canada as compared with those prevailing in the United States.

I think, in view of the close relationship of the two countries, it is desirable that our census be made along the same lines as that of the United States.

The CHAIRMAN.—The resolution will be submitted in due course to the Executive Committee and by it referred back to the Association, when it will be taken up for discussion.

With reference to any discussion on the paper just read, it has been suggested that as two papers upon the subject of "Tuberculosis" will be read to-morrow afternoon, it would be well to postpone any discussion until after those papers have been read. Dr. Smith is ready with his paper, which will only take a few minutes to read, and then the time will have arrived for the trip of to-day.

Dr. WM. M. SMITH, of New York City.—Gentlemen of the Association, I will detain you but a few moments. I desire to explain to you why the New York quarantine is located where it is, almost amid the waters of the ocean; secondly, the cause of the extensive improvements which we are now undertaking, and which are now in progress of completion. These are the reasons why: We have made a departure, in the arranging of a crematory upon our hospital island for the cremation of persons dying from the infection of contagious diseases. These will be very briefly considered. If I go over a little of the well crowded past history of quarantine, you will bear with me. (See page 201.)

After the reading of Dr. Smith's paper, the Association adjourned to visit the quarantine station, New York harbor, upon the invitation of Dr. Smith.

EVENING SESSION.—8 O'CLOCK P. M.

The President.—The Association will come to order. I believe the Chairman of the Local Committee of Arrangements has some announcements to make.

Dr. Raymond.—The President of the Brooklyn Board of Education, Mr. Henry Henriques, extends a cordial invitation to the members of the Association to visit the public schools of the city during their stay.

Through Dr. Harrigan, a member of the staff of St. Mary's hospital, the authorities of that institution extend a similar invitation.

I received to-day from Henry Chadwick, brother of Sir Edwin Chadwick, whom we all know so well as an efficient laborer in the cause of hygiene, a letter, transmitting several pamphlets upon sanitary subjects, written by the latter, which have been placed in the hands of the secretary.

The President.—The first paper of the evening will be by Dr. Sternberg, on "Recent Researches Relating to the Etiology of Yellow Fever." (See page 170.)

The President.—The next paper of the evening, gentlemen, is by Dr. Theobald Smith, of Washington, D. C., on "Preliminary Observations on the Micro-organism of Texas Fever." (See page 178.)

The President.—The next paper, ladies and gentlemen, will be upon a kindred subject, by Dr. Salmon, chief of the Bureau of Animal Industry, of Washington, D. C., entitled "Some General Remarks on the Subject of Texas Fever." (See page 176.)

The President.—The next paper, ladies and gentlemen, is one which I am sure will interest you all. It pertains to a subject in which not the doctors alone, but the ladies, also, and the young sanitarians, are much interested. It is on "The Art of Cooking," by Mr. Edward Atkinson, of Boston. The ladies and gentlemen will be interested in seeing his kitchen, I know.

Mr. Atkinson.—Ladies and gentlemen, it seems to me almost absurd to bring such a prosaic subject before you at the present time; but I will endeavor to do it as well and as fully as the time and circumstances will permit. I propose to call in the cook. I shall not give you much of a supper, but will, at least, give each of you a taste. (See page 151.)

The meeting adjourned to Thursday, October 24, at 9 A. M.

THIRD DAY.

THURSDAY, October 24, 1889.

MORNING SESSION.—9 O'CLOCK A. M.

The PRESIDENT.—The Association will come to order. Announcements and reports from the Executive Committee are in order.

The SECRETARY.—Mr. President, the members of the Association will take notice that the afternoon session will be held at the Hoagland Laboratory instead of in this hall.

I have here the applications of twelve persons for membership, which have been approved by the Executive Committee. I therefore move that the President declare them elected as members of the Association.

This motion was duly seconded and carried.

The PRESIDENT.—Their names have been approved, and they are declared elected members of the Association.

The roll of members of the Advisory Council was called yesterday. There were some vacancies. From Colorado, Dr. A. A. Clough reported and has been appointed; from Vermont, Dr. C. L. Allen. That, I believe, is all. The states not responding yesterday will be called, and if there are any members of the Association present from those states, they will please report, in order that their names may be placed upon the list of the Council: Alabama, Dakota (either of the Dakotas), Montana, Delaware, Georgia, Mississippi, Texas, Virginia, West Virginia, Manitoba, New Brunswick, or either of the provinces of Canada,—with it Columbia.

There seem to be no additional reports to be made, and the Council is requested to meet at 10 o'clock.

Dr. J. D. PLUNKET.—Mr. President, I want to add that, suppose the member from Tennessee, whose name appears, should not accept: what would be the proper thing to do?

The PRESIDENT.—If an alternate for him is not present, I will designate Dr. Plunket.

The PRESIDENT.—The discussion of the papers on "The Disposal of Garbage" will take place at the end of the forenoon session, and not after the reading of the paper. I mention that fact for the information of the members of the Advisory Council who might desire to be present at that discussion. The paper upon tuberculosis, written by Dr. Hunt, read by Dr. Lindsley yesterday, was not discussed. Dr. Billings will open the discussion.

Dr. BILLINGS.—Mr. President and gentlemen, I regret very much to find myself differing greatly in opinion from my friend Dr. Hunt in a matter of this kind, especially as the difference is not only as to the scientific position of the question, but also as to the desirability of giving to the public the idea that the American Public Health Association is in doubt as to what should be done to prevent the spread of tuberculosis. In preventive medicine, and in the practice of medicine, we have to deal very largely with probabilities, not with mathematical certainties. The diagnosis of a case of a disease is, for the physician, a matter of probability, and attempts at preventive medicine are very seldom founded on absolute certainty. It is not certain, if you let a little child of two or three years of age, who has not had scarlet-fever, sleep in a bed with another child suffering from that disease, that it will have scarlet-fever; nor is it certain that an unvaccinated person going into a room containing a small-pox patient will contract small-pox, or that a man who drinks water polluted from a privy vault will get typhoid fever. All of these things are matters of probability, some greater, some less. It is nine to one that the person will contract scarlet-fever or small-pox under the circumstances mentioned, but the probabilities may not be over one in one hundred that a person who drinks the polluted water will get typhoid fever. Nevertheless, we all agree that these probabilities are great enough to warrant the taking of strong measures to cut off the supposed cause of disease. Probabilities guide us in all directions in life. The farmer sows the seed on the probability that there will be a crop; you come to this Association on the probabilities that there will be a sufficient number of members here to make an interesting meeting. Hence, though it may not be absolutely certain that the *bacillus tuberculosis* is the sole cause of tuberculosis, and it is true that the disease is not always communicated by the sputa, since it may be communicated in other ways, the probabilities that the sputa are the most frequent means of its transmission are so great, that it is proper for us to urge special precautions in dealing with them.

For the last five or ten years, in many laboratories, observers of more or less skill have been carrying on experiments with this bacillus, examining not only cases of consumption, but also trying to find this particular specific bacillus in the sputa or secretions of persons affected with other diseases than tuberculosis. They have not succeeded. They have also been endeavoring to find cases of undoubted tuberculosis in which the *bacillus tuberculosis* was not present. In some cases it has been extremely difficult to find it, and at first, before the subject was well understood, and before the necessity for careful investigation was fully apparent, some cases of tuberculosis were reported in which they failed to find the specific bacillus. Of late years, however, it is admitted by all skilled bacteriologists that the specific bacillus is not only the accompaniment of tuberculosis, but that it is the efficient cause of this disease.

With regard to methods of transmission of this particular form of bacillus, recent observers and experimenters upon this subject, as represented in the reports of the Paris congress on tuberculosis, are all agreed that the transmission of the bacilli from one person to another is usually effected through the means of the sputa, though it may also be effected through food, such as meats and milk. The fact that there is practically no transmission of the bacillus by means of the breath has been ascertained by direct experiment, by the examination of the air expired by persons suffering with tuberculosis as to whether there are any bacilli in it. Dr. Hunt in his paper speaks rather contemptuously of that mode of experimentation, saying that it is out of the region of biology, and belongs to physics. Physics, however, is an essential part of the foundation of biological and of pathological studies. It has been demonstrated over and over again that bacteria are not taken up by a gentle current of air from fluids or moist surfaces, such as the membranes of the mouth. It was proved experimentally, before this question of the mode of conveyance of the *bacillus tuberculosis* was brought up, that air could be drawn over putrefying liquids containing bacteria, and then through sterilized culture fluids without inoculating those fluids, showing that germs are not taken up from liquids by gentle air currents. Such experiments were made in Glasgow with fluids in water-closet traps, and also under the direction of the National Board of Health and of Prof. Pumpelly, proving that the evaporation of a fluid does not remove the micro-organisms from it, unless spray or breaking bubbles are formed. Dr. Hunt thinks that this is not certain. Why not? Has he ever tried it? Can he bring up a single example of anybody who ever tried it and got a different result? I speak with some confidence because I have made these experiments myself, quite a number of them, by passing air over putrefying liquids in order to see whether the germ will be removed.

There seems to have prevailed, in times gone by, some very curious ideas about the possibilities of evaporation. For instance, it is stated in Parke's Hygiene that by evaporation small tadpoles have been lifted out of the ponds and carried up into the sky. How a man of so accurate knowledge as Dr. Parke could have accepted such a theory as that, I cannot understand. Of course the theory that the showers of tadpoles are due to whirlwinds carrying into the air the water from small ponds, etc., is quite a different matter from that of the lifting a tadpole or a grain of sand out of a pond of water by the force of evaporation.

Now, putting aside the question of the transmission of tuberculosis by milk or meat, which is now attracting very great attention, all the evidence points to the importance of the transmission of the disease from person to person by the dried sputa, containing the spores of the specific bacillus, in the form of fine dust, such dust being lifted and carried by currents of air and inhaled. The proposal to attempt to reduce the amount of tuberculosis in a country by carefully disinfecting the sputa of consumptive persons as it is formed is not only an eminently rational and proper proceeding, but it is almost the only thing which can be done. If we reject this as being of little or no value, and attempt to control the spread of the disease by hereditary and climatic conditions, and so on, by the old methods that we have had so much advice about for many years, we can expect no better results than we have had heretofore. Here is a method which, in common with most bacteriologists and sanitarians, I believe can, in the course of a short time, greatly reduce the prevalence of pulmonary tuberculosis in a community. This thing had been practically tried long before anything was known about the *bacillus tuberculosis*. For a long series of years in Naples pulmonary phthisis was declared to be a contagious disease, and was treated almost with the rigor with which they treated small-pox or pestilence, with little consideration for the lives or comfort of the unhappy persons afflicted with it. They were set apart, isolated from the rest of the community. If they were allowed to remain in the city, the houses were placarded; generally they were not allowed to remain, but were put in a special hospital. At the beginning of the period, deaths from consumption formed a very large part of the mortality: at the end, the system fell into disuse because the disease had nearly disappeared.

It is a simple matter to disinfect sputa if those affected are willing to take the trouble to do so,—now, when this is generally agreed upon by the clinical physicians, the bacteriologists, and scientific men of the present day who have actually investigated the matter for themselves. I am exceedingly unwilling to allow any paper to go out from this Association which seems to indicate that it is still doubtful whether, on the whole, the bacillus has anything to do with the production of pulmonary phthisis, and if so, whether it is communicated by the sputa or not.

The question of heredity in disease is one of the problems at present upon which the biologist and the pathologist are working, and undoubtedly it has its influence in reproducing a tendency to a condition of things in the organism in which the bacillus can especially flourish. We know that that condition which is favorable to the development of the bacillus can be produced long after birth by foul air. The statistics of the English barracks are sufficient to show that. There is the well known case where they undertook to erect a house for the monkeys in the Zoölogical Gardens in London, and they made it on the plan of the English drawing-room, very close and warm, and within twelve months the majority of the monkeys died of tuberculosis. So that we have other things to take into consideration beside the bacilli themselves. Nevertheless, the bacillus is the efficient cause; and in so far as we can prevent its spread, so far we prevent the spread of tuberculosis in the community.

To revert to my first proposition: I will admit that there is, perhaps, in estimating the probabilities, one chance in ten thousand that the *bacillus tuberculosis* is not the cause of tuberculosis. There is, perhaps, one chance in ten thousand that the bacillus might be conveyed in a person's breath, under certain circumstances—if they were spitting and got a few particles of the fluid in the inhalation—but there remain nine thousand nine hundred and ninety-nine chances to one that the bacillus is transferred in the sputa by the tuberculous patient, and there are nine thousand nine hundred and ninety-nine chances to one that the specific bacillus has been the immediate cause of any case of *pulmonaris tuberculosis*. In advising the people, we do not stop to discuss the formula of nine thousand nine hundred and ninety-nine to one. We would best not confuse them with such exceedingly fine and minute calculations. If we are to use our knowledge to prevent the spread of tuberculosis in the community, the community must be educated to understand it and to get the idea of what it all means, and of the necessity and the desirability of it. It is not going to be done by the arbitrary enactment of a law by a state or city, to begin with; and in that process of educating the community and teaching them what the probabilities are, the part that this Association has played heretofore, and is destined to play, in my judgment, is an extremely important part. Hence, I have felt it rather more important to object to this paper of Dr. Hunt's than to many other papers with which I might not wholly agree; for his reputation and position are such that his opinions, very properly, have great weight.

The PRESIDENT.—The further discussion of this paper will have to be deferred, as we have two papers bearing upon a different subject this afternoon. It will be resumed later.

Dr. ALBERT L. GIHON, U. S. N., of Brooklyn.—Mr. President, without discussing the subject, will you allow me to offer a resolution, which can go through the usual routine, pertaining to the remarks of Dr. Billings. The object of this Association is to speak authoritatively. We are here for the instruction of the community. In the New York *Times*, the other day, there were some sarcastic comments in an editorial upon our meeting, to the effect that a set of laymen would have arrived at about the same conclusion that we did. There was nothing said about the opinion of the Association. With a view to having this matter more fully discussed, and something given to the community as a final action, I have drawn up this resolution:

Resolved, That it is the sense of this Association that in the interests of public health the community should be instructed that the destruction of the sputa of tuberculous patients is an absolutely essential part of the means for the prevention of that affliction.

The PRESIDENT.—The resolution is referred to the Executive Committee without discussion.

The list of the Advisory Council is not yet complete. The member from New Jersey has signified that he will not be here, and I will appoint in his place Dr. A. Clark Hunt.

The next paper on the programme is the "Disposal of Garbage at Milwaukee," by R. Martin, M. D., Commissioner of Health, Milwaukee, Wis. (See page 63.)

The next paper on the programme is "Statistics on River Pollution, with Observations upon the Destruction of Garbage and Refuse Matter," by S. S. Kilvington, M. D., Commissioner of Health, Minneapolis, Minn. (See page 56.)

Dr. KILVINGTON.—Mr. President, before I attempt to read my paper, I would like to make a short statement in reference to the conditions under which it was prepared. For many years I have been studying very closely this subject of the disposal of garbage and refuse organic matter from towns, cities, and villages. I had the honor at the last meeting of the Association to be associated, by order of the President, with the following eminent gentlemen, members of this Association: Crosby

Gray, Pittsburgh, Pa.; Dr. Oscar C. DeWolf, Chicago, Ill.; Dr. Louis Laberge, Montreal, P. Q.; Dr. Henry H. Clark, McGregor, Iowa; Dr. Edwin Clark, Buffalo, N. Y.; Dr. Granville P. Conn, Concord, N. H.; Dr. John Coventry, Windsor, Ont.

To the gentlemen whose names I have just read was delegated the important duty of informing themselves, with a view to reporting to this Association, as to what was the best method for destruction of garbage and refuse matter. Unfortunately, many of the members, through circumstances over which they had no control, have been prevented from participating in this investigation. I have had opportunities that very few have had. I investigated to some extent. At the outset, some ten months ago, I communicated with each individual member of that committee, asking his coöperation and advice as to the best method to be pursued in accomplishing the object for which we had been appointed. I received in reply from the seven members of that committee three letters, one from Crosby Gray of Pittsburgh, one from Edwin Clark of Buffalo, and one from Granville P. Conn of Concord. They had no definite views as to the best methods to be pursued, not having completed their investigations.

We had a meeting Tuesday afternoon at 5 o'clock; there was no quorum, only four members being present. After discussing this matter thoroughly, the committee felt that under the circumstances it would be unwise to recommend to this Association any method they were not conversant with. That was the view of the majority. The facts of the case were, that there were but two of us who had made any investigations whatever,—Dr. Clark, of Buffalo, and myself. I have prepared a paper, independently of the committee, to present to the Association for their consideration. In view of the fact that the committee believed it for the best interests of the Association to be very cautious in the steps taken, it was considered best to read the paper as an independent paper. (See page 56.)

Dr. Kilvington.—You will observe that while reading the paper I have not mentioned any communications received from health officers with whom I have communicated in defence of the Mertz system. I speak of this because Dr. Clark, of Buffalo, has called your attention to it. I received but thirty-three answers. None of them spoke of the Mertz system, except that they had it, and were investigating it; but there were no expressions used. I received Dr. Clark's letter when I returned from the mountains, prepared to come to this meeting, after I had been absent from the city since the first of October; and it did not arrive at the time set for it. It was written on the 3d of October, when the express understanding of the circular sent out by me was that it should be in my hands by the first of October.

Dr. Byron Stanton.—How many of the health officers who recommended cremation had had any practical experience?

Dr. Kilvington.—I think thirteen had had practical experience.

Dr. Stanton.—How many of those crematories have been abandoned since they were built?

Dr. Kilvington.—I do not know of any.

The President.—The paper will be reserved for discussion at the close of the session, or after the next paper has been read.

Dr. J. B. Ralph, of Nebraska, is appointed upon the Advisory Council. Dr. Billings left the city this morning, and Dr. Sternberg will take his place as a member of the Advisory Council.

Commissioner Colman, through a member of the Local Committee, extends an invitation to the members of the Association to examine his new garbage-crematory and other refuse-disposing apparatus.

If the members will go to the Hoagland Laboratory at half-past two, Dr. Sternberg will be there to show such attention as may be helpful in understanding the apparatus and modes of proceeding.

[Dr. Montizambert in the chair.]

Dr. Ashmun.—I have a resolution I would like to offer and have sent to the Executive Committee:

Whereas, Notwithstanding the announcement that diphtheria as a subject for special consideration would be brought finally before this committee; and,

Whereas, It now appears that no paper on the subject has been prepared and presented at this meeting, and therefore no discussion can or will be delivered; therefore be it

Resolved, That this Association declare its appreciation of the importance of this subject and the necessity for the concentration of the attention and knowledge of the members of the Association, boards of health, medical students, and the general public to the necessity for all methods of preventing this continued cause of disease and disability throughout the land, and

Resolved, That the Executive Committee of this Association be and hereby is instructed to secure the best possible presentation of the whole subject of the cause and prevention of diphtheria for the next meeting of this Association.

The Chairman.—The resolution is received, and goes without debate to the Executive Committee.

W. S. French, C. E.—Mr. Chairman, I would like to offer the following resolution:

Whereas, In the preparation of vital statistics, it is evident that there is a considerable diversion of opinion as to the classification of disease; and,

Whereas, It is of importance that there should be no such diversity; therefore, be it

Resolved, That this Association declare a system of classification of disease, and recommend the adoption of the same by all parties preparing vital statistics.

The Chairman.—The resolution will be received, and go without debate to the Executive Committee.

Dr. C. P. Wilkinson, of Louisiana.—Mr. Chairman, I would like to offer the following resolutions:

Resolved, That the Executive Committee is hereby instructed to select subjects for papers and the authors thereof for the next meeting, and also to invite members to open the discussions;

Resolved, That all papers shall be forwarded to the local Committee of Arrangements at least thirty days prior to the session of the Association, and that two hundred copies be printed and ready for distribution on the day of the meeting.

Resolved, That all papers ordered by the Executive Committee shall take precedence of all others.

Resolved, That all papers on interesting topics are most cordially invited.

The CHAIRMAN.—This resolution will be submitted, in accordance with the usual custom to the Executive Committee, to be reported by them back to the Association.

The Chair will now call upon Prof. W. O. Atwater to read his paper on "Food and Health." (See page 208.)

Dr. G. C. ASHMUN.—Mr. Chairman, I would like to ask the professor one question. Can he tell us how it is that the amount of fat is largely increased as compared with our American ratio, and larger than almost any other percentage presented on the foreign side?

Prof. ATWATER.—I presume it is because on the other side they have to have their food in a more concentrated form. You get a little over twice as much potential energy in an ounce of fat as in an ounce of starch or protein food. They use a very large amount of fat, and, aside from that, I suppose it was the kind of food which was most convenient for them to get. You will see the quantity of carbohydrate was very small.

Dr. JEROME WALKER.—I think it is a mistake for Prof. Atwater to appear, or, at least, to leave the inference that one professor can be better than another in his opinion as to the amount of food to take. Looking at Prof. Atwater, I should say that he was a man very fond of good things. I think I can find another professor exactly in the same line of thought, who does not care as much for food and does not need as much food as Prof. Atwater. Somebody remarked, "Atwater has a good waist." I said, "That does not mean that he does not waste any thing." Now I can find a man who may not have as good a waist; but he perhaps does not need as good a waist. This matter of comparison of men to men is therefore unfit. It is not a comparison, and I merely referred to it because, as a comparison, it may mislead. There is no doubt at all that usually most of us eat a great deal more than we ought to.

I will briefly give an account of an experiment which I tried, in my former interest in this matter of diet. I had a little talk with the members of my family about the nutrition of food. One day one of the members of the family expressed a wish that she could eat what she wanted to; if she could do this, she would be absolutely and perfectly happy. I told her it would not be wise. Then I asked each of the children what they liked most, and found a great variety in the matter of likes and dislikes. I then said, "You draw up a bill of fare for the week. Each one of you put in what you like most, only remembering this, that the food must be economical and nutritious. You have a perfect right to ask your mother whatever question you want to ask." The diet list was handed me, and I was asked to decide which was the best dietary. I found it was one made by one of the boys. We thought it wise to put it into operation. As I have five children, there were five dietaries, each dietary to run a week, making five weeks in all. We started in on a seven weeks' experiment, absolutely following out the diet tables made by each of the children, with this understanding, that each child must eat of everything every other week, providing that on its week it should have what it liked. The result was worth a great deal. We tried it all winter, and shall probably try it this winter. Buying the material, I took the children along. I proved to this girl that turkey was expensive as compared with beef; that she could buy fourteen pounds of beef for a certain amount of money, and be able to get three or four meals out of meat, and only one meal out of turkey. That lesson in economy has never left them.

I was interested yesterday in what a gentleman told me in regard to the way in which he brought up his babies. He acted, not on the principle that babies should not have any food excepting milk, but that they should not be allowed to eat all that they desired, should stop short of absolute repletion. He found that that sort of thing was the very best thing for his children, and I believe this to be true.

As to this matter of fat and sugar: Any one in the army during the war knows very well, as I know from actual experience, that the rations given in the United States army were ample, so that it was a very common thing among the soldiers not to attempt to eat up all the food supplied to them, but to send back to the commissary what they did not use, the government paying back and using the money for a regiment fund, and for other things. This policy was probably on the same line as that of the German government giving its army more than it absolutely needed.

We believe, as physicians, in a certain amount of food being essential in wasting diseases and diseases of digestion in children; and I should regret to give out the idea that food might be disregarded to a very large extent, because it is difficult to get any children to eat fat, and fat meat is almost disregarded. It would be well to insist upon a certain amount of fat being used. There is no doubt that too large a quantity of meat is used. I think that we should all be willing to give our testimony that we have succeeded in relieving headache and all sorts of troubles by simply cutting down the meat diet. I have in my lectures in the high school insisted upon it that for the average person meat once a day, or, at the most, twice a day, is ample and sufficient; that meat three times a day is not to be used by any one, except by a hard working man, having to do a great deal of hard work in a short time. We use too much sugar in the shape of poor, cheap candy; and many of the troubles of children are due to the use of sugar, and also of animal crackers. These crackers, in the form of animals, are very interesting to children. The mother will give the child money to go out and buy animal crackers, for the child would not go out and buy ordinary crackers. I remember one day seeing a lady rolling a baby carriage over a porch, the child having a little bag of animal crackers. She and I had a talk together upon the subject, and, as a result, the animal crackers were left off, much to the child's advantage.

Taking the papers of Prof. Atwater and Mr. Atkinson together, we have had two very valuable talks; but if Prof. Atwater is going to tell us that people need but a very small amount of food, and if Mr. Atkinson is going to tell us that we can cook that amount of food at the smallest possible expense, then we really need some other gentleman to tell us where we can get the money to get that small amount of food and cook it at a small expense.

Mr. Atkinson.—Mr. President, it may be interesting to know that the dietary in Lowell, represented by the factory operatives, is the dietary furnished at the lowest cost in proportion to the abundance of food, and where the food ratio represents the lowest parts of the actual expenses of those who are fed. You will remember I said last night that, in the average household of mechanics, operatives, and the like, one half the income is expended for the material of food, and the proportion to income increases as we go down in the rate of wages.

These factory boarding-houses at Lowell belong to the corporation. They are considered a part of the plant. They are not expected to furnish a profit, except through the goods, and the rental to be paid by the boarding masters and mistresses is sufficient to keep the house in repair. But the profit on the house is expected to come out of the goods, and not out of the house itself. The boarding masters and mistresses furnish a room for two persons, with their washing, for $2.25 a week. When provisions are very high, instead of advancing the rate of board, the corporation sometimes pays twenty-five cents a week, and charges it to the cost of goods. That is a matter of business. These women who board at $2.25 a week take their meals there, and are furnished with twenty-one meals a week for $1.60, and that does not represent more than about one fourth of their income, against one half, as Dr. Walker brings out, in all artificial and charitable coöperations. This is done in a different operation, in bringing together and reducing the cost of each person by combination and enabling him to have pie three times a day.

I was once asked by an Englishman how the deterioration of the American was to be accounted for. I did not quite like the form of the question. I knew that some prominent physician had proved that the American boy was stronger and better developed than the English boy at Oxford or Cambridge. In every thousand garments of regimental clothing there are a certain number with so many inches around the chest, so many inches around the waist, so many inches long in the leg; and those proportions vary according to the customs of the country and according to the race. The Scandinavians of the North-west require a different average size from Southern people, and so on. I got the statistics of 200,000,000 people, covering twenty years, and deduced from this the size of the American man to be about 5 ft. 9 in. high, 34 inches around the chest, 36 to 37 inches around the waist, and 155 to 160 pounds in weight. There is no European race that I know of that will approach that according to the statistics. The statistics in the South show that the Southerner, since the war, has grown one and one half inches around the waist. I confess that I was a little puzzled at this, and I at first attributed it to the darkies coming in and buying ready-made clothing; but the darkies buy most of their clothing second-hand.

I wrote to a number of large dealers in clothing, and asked them to give me the reason for the increase in size; and they all said that since the war the progress of industry, and the increased nutrition of the Southerner, have built him up around the waist.

Reference is made to the food question in connection with disease. A gentleman told me that during his college life he had had the dyspepsia very badly. He tried all sorts of diet, all sorts of medicine, and finally gave himself up. Nothing could cure him: so he concluded to have one good dinner, and then lie down and go to sleep. His idea of a good dinner was beefsteak, fried onions, and brandy and water. He went to Parker's and got his good dinner, and went home and went to sleep, and got up the next morning feeling a great deal better. [Laughter.] He followed that up for six weeks, and he now weighs more than I do, and is somewhat older, although I weigh 207 pounds.

I did have a memorandum about fat meat. I suspect that one might make a great blunder in this matter. I have tried to reduce my weight, and have not succeeded very well, though I found that, by adopting some articles of food, and avoiding fat and sugar, I got up some conditions worse than before. I came to the conclusion that a man would better eat what he wants, and take as much exercise as he can, and trust to nature to do the rest. [Applause.]

I was struck with some remarks made immediately after my lecture last night, and some made during the day.

It is a joke with us manufacturers that every time a man comes along with a new invention, especially in the matter of the consumption of fuel under boilers and engines, etc., that if we were to take all the inventions that were offered, we should have coal to sell.

In the matter of bacteria, I have come to the conclusion that to avoid all these little pests that infest humanity, we ought not to eat anything. Therefore we may perhaps follow the order of nature in that. I recollect with great satisfaction one of Dr. Holmes's sayings, that the "whole of life is to cure, not to kill; so I trust to nature, and eat the bacteria, if they happen to be there." [Applause.]

Dr. STERNBERG.—Mr. President, gentlemen, I had not the pleasure of hearing the greater part of the paper read; but the final remarks of the gentleman who has just spoken to you induce me to take the floor for a moment. It is simply to insist upon the fact that bacteriologists have been trying to instruct the public that there are bacteria and bacteria; that the common, every day bacteria which are in the water, everywhere about us, are not injurious. We have evidence of that, and yet a learned divine upon the platform the other evening spoke of bacteriologists' holding up these bacteria as terrible creatures, which must be avoided. The cleanest mouth is full of them; the finest water contains them in certain numbers. It is a question of kind; it is a question of extent and of quantity. If you have the typhoid bacillus in your pure glass of water, that is one thing. Why not teach the public that these ordinary bacteria are not things to be avoided, instead of frightening them. I think that this Association will assist in disabusing people of the illusion on that point. [Applause.]

Mr. Atkinson.—Mr. President, I should like to say another word regarding an observation made as to my own children. Some one said that it is difficult to get children to eat fat. So it is. However, I find that if the fat is lightly cooked—if it is cooked and not rendered—the children come and ask for a little of it, which they never did before. They like it now. It is cooked, and is not associated with any unpleasant taste.

Prof. Atwater.—Mr. President, I should like to say a word with reference to the remark made by one of the first speakers as to the comparison between two people on the same question. It was intended as an illustration of what appeared to be a general principle,—this general principle being based, not upon a single observation, but upon a very large number, of which these are only facts. The gentleman also spoke of myself and of another hypothetical person, and of the superiority of the two, if I may be allowed to make so personal a remark. I do not say that he was absolutely mistaken. While I do not know of any way of positively confirming the statement that we all eat too much, and too much fat, and all that sort of thing, I am very well aware that "one swallow does not make a summer," nor do any number of "straws show which way the wind blows." But if you are watching a long while, and see a great many straws all blowing the same way and very fast, you cannot help thinking that that indicates the probable direction of the wind. That is about my own experience.

Mr. Atkinson.—Mr. President, nobody could appreciate the work of the bacteriologists more than I do; but when it comes to the point that I am told that I must not eat any more rare meat, and must not eat this or that, then I think there are "bacteriologists and bacteriologists" as there are "bacteria and bacteria."

The President.—The discussion on the papers read on the subject of the "Disposal of Garbage" and other refuse matter will now be in order.

Dr. Clark.—I believe that it is universally admitted that the disposal of garbage and refuse matter is one of the most important sanitary questions with which sanitarians have to deal at the present day. I believe that it is equally well admitted that the disposition or placing of garbage and refuse matter—the question of the proper disposition of garbage and refuse—is one of the most important questions which is to-day engaging the attention of sanitarians. I believe that it is admitted on all hands that the practice of dumping garbage in the rivers and lakes is one which cannot be too strongly condemned, and one which, in the near future, will be abolished by rigid legislative enactment throughout the country. I believe, also, that the practice of using garbage for filling in building lots, or of depositing it in places where it can be exposed to atmospheric changes, is a deleterious and dangerous one. In view of this almost universal belief, we have a very important question for our consideration:

What shall we do with our garbage, and what shall we do with our refuse? A great many advocate the destruction of garbage by burning. I have seen and studied into the action of some cremating furnaces, and I believe that they have their uses. They certainly reflect a great deal of credit on the skill and ingenuity of their inventors, and they are useful for the purposes for which they were designed; but, as the health officer of the city of Buffalo, I want to say a word or two in regard to a method which we have in use in our city, called the "Extractive Method," or, to use the name of the method, the "Merz Method." The city of Buffalo for many years dumped its garbage into the Niagara river; we also discharged our sewage into the Niagara river. Four years ago an injunction was secured in the courts, restraining the city of Buffalo from using the Niagara river as a dumping-ground for garbage and refuse matter. It immediately became necessary for the contractor, who has the contract for cleaning our streets and disposing of the garbage, to devise some means by which this garbage could be disposed of, and in a manner meeting the approval of the board of health. A committee was appointed, consisting of our common council, members of the board of health, and also our city engineer. They visited various cities throughout the country, and examined various cremating furnaces. They made a report upon their return that they had not found any cremating furnaces in operation which they thought would be suited to the wants of Buffalo, and which they felt at liberty to recommend. All the time the contractor was earnestly trying to secure, or to hear of, some method by which he could dispose of the garbage. He heard of the "Merz system" being experimented with in New York, and he invited the managers to come to that city; and here the first plan was put in operation as a destroyer or a machine for the disposal of garbage.

A great many principles are involved in the working of what is known as the "Extractive Method" or the "Merz Method," and I think it will not be out of place for me to say a few words by way of explanation on the disposing of garbage by this method. The garbage is first of all placed in hermetically sealed dryers, a cylinder within a cylinder. It is then subjected to a heat of 350° Fr. by means of superheated steam run between these two cylinders. I do not believe there is a man on the floor of this convention who will not agree with me that a temperature of 350° is absolutely destructive of any disease-producing germs known to science. I have heard a statement that 350° would not destroy some bacteria. This is a revelation to me, if true. The matter is treated in these dryers, by means of which all the moisture and organic gases are driven off into vapor, passing through a column condenser. It is all condensed into water, after having passed through the temperature of 350°. The residue resulting from it resembles dry, brown earth, containing what is left of the garbage and the oil which it contained. This then passes through another extractor, and, by means of a chemical solution working automatically under a water bath, all the oil is extracted from this first product. The result is a product which is used as a fertilizer.

That is a brief description of the method. It has been said by someone that this is not a sanitary method; but if you can conceive of anything more sanitary than placing garbage in a receiver, hermetically sealing it, subjecting it to a heat of 350°, and bringing out a dry, brown substance, then I do not know what it is. I think this is a perfectly sanitary method, and this seems to be the universal opinion of every one who has seen it; and it is entirely within the bounds of strict sanitary science. I have visited the works in Buffalo a great many times. I go there in my official capacity to see the works, and I must confess that the whole thing is to me a sanitary revelation. I do not wish any one to infer from what I say that I am interested in this concern from a financial stand-point. I know nothing whatever of the cost of it, or the value of what it produces. I have no interest whatever in it, except as health officer of the city of Buffalo. It seems to be the almost universal opinion of men who have visited the works that it is essentially a sanitary invention. We have leading health officers from Chicago, Milwaukee, St. Paul, Detroit, Baltimore, New York, New Jersey, Syracuse, and other cities and states; and they all unite in saying they believe that the Merz system is a sanitary invention in every sense of the word. Dr. Whitfield, the assistant postmaster-general, and for a long time a member of the Board of Public Works of Cincinnati, started out, at the instance of the Board of Public Works of Cincinnati, on a tour to examine the various cremating furnaces and other methods in use for the disposal of garbage. In a book, which I see has been placed in this room, you will find his report, or, at least, a part of it, with the reports of other health officers. They all unite in saying that they believe the Merz system to be the best they have ever seen for the disposal of garbage. I do not believe any question is raised, or any reference made to the expense, because these gentlemen who have visited Buffalo and these other cities where these works are all in operation, view them as sanitary men and not from a financial stand-point. Chicago and Milwaukee are using it, as we have heard this morning. St. Paul is erecting a plant. Denver will soon have a plant; and other cities are negotiating to have the works placed in their cities.

The admirable paper read this morning by Dr. Kilvington was a very interesting one, and in it he gives you the opinion of the men who advocate cremation, to the exclusion of every other process. I believe if you will make careful inquiries, that the men who write these opinions have never seen the Merz method, although perhaps some who write letters advocating the Merz method have never seen a crematory. I believe, from my observation and experience, that the destruction of garbage by what is known as the "Extractive Method," is far ahead of cremation. [Applause.]

Dr. McDonald.—Mr. President, I should like Dr. Clark to be a little more definite with regard to this garbage matter, as to what should be included in it. I live in Kansas city. The question is now agitating the people there. We have to dump all the garbage into the Missouri river, and that is a big stream. It is getting to be a very serious question. I should like Dr. Clark's remarks to show us what should be done with the night-soil. Manure does not come under the head of garbage, and I would like to know if it is disposed of in the way he mentions, under the Merz process.

Dr. Clark.—I should like to say in respect to that, that in the city of Buffalo we do not have to cremate any manure. We sell it for a dollar a load. The farmers come into the city and buy it, and keep the stables clean.

Dr. McDonald.—We cannot do that in Kansas City: the country is too rich.

Dr. Clark.—I speak in reference to my own city. In regard to night-soil, it is carried into the Niagara river with the sewage. In those parts of the city where we have no sewerage, we have a number of licenses for cleaners who clean the vaults at night, and carry it into the country, where it is mixed with earth and used as a fertilizer. The street-sweepings are used for filling purposes. We have no manure or night-soil to dispose of, except that we have already provided for by running through the sewers and into the country as a fertilizer. Dead animals of all kinds except the larger kinds, such as horses and cows and dogs, go into the garbage. Dead cattle and horses are immediately purchased by the Rendering Works. It is sometimes necessary to kill diseased cows, and we get from $5 to $12 a head for them to be rendered into fat. A short time ago I remember they killed in Buffalo seventeen head of diseased cattle. We have a rule that any disease in cattle brings them under immediate condemnation, and we order their slaughter. We sell these cattle for $12 a head.

Dr. Conn.—Mr. President, as a member of the Committee on the Disposal of Garbage, I have but a word to say. On account of disagreement in regard to the work of that committee, it was thought best not to render any report. The question was limited originally to the disposal of garbage. Now I believe that the ordinary definition of the term garbage covers only the small portion, and by no means the worst portion, of what we have to get rid of. From the gentlemen who last spoke I learned that the committee or association owning or governing the Niagara river, got out and enforced a prohibition against throwing any of the garbage of the city of Buffalo into that river. At the same time, as I understand it, they allow the emptying of all the sewers of the city of Buffalo into that river. Now I submit to this Association, if by far the worst portion of the refuse of the city of Buffalo is not permitted to flow down that river? Consequently, in the committee, it was considered that it was for the best interests of the Association and of the public that the consideration of garbage and of waste and diseased materials should be limited. As to the method by which they shall be disposed of, of course there may be honest differences of opinion; and the question as to whether this machine, or this cremator, or that form of chemical solution or this, shall be used, is a matter with which this Association has nothing to do. It has been said, and was said in the committee, that we had nothing to do with the economical condition whereby the disposal of garbage, or the disposal of waste and of these materials, should be brought about. I say to you, that the economical conditions are the conditions that we must uphold, and until we can show the people of this land an economical way of disposing of their garbage, we shall never get beyond individual effort, or that of a combination of individuals for purposes of their own in the way of financial improvement. When we can show to the people that waste and effete material is of value, and in some way can be converted into material that can be used over again, then we shall solve this difficult question, and not till then. For that reason, it was thought best by the committee not to make any report.

Dr. F. P. VANDENBERG, of Buffalo.—Mr. President, since the discussion of the injunction which was gotten out has come into prominence, let me explain personally the way in which it came about. There is an organization known as the "Niagara River Protective Association," a company of gentlemen who enjoy fishing and sport, and the dumping of garbage in very large quantities, coming from our city of 250,000 inhabitants, proved very detrimental to their pleasures. That was the beginning. About three years ago the inhabitants of Tonawanda, ten miles below the Niagara Falls suspension bridge twenty miles below the city, banded together and sought through the court an injunction permanently restraining the city of Buffalo from dumping any of its garbage into the Niagara river. As chemist of the city of Buffalo, under direction of the city attorney, I made a great many analyses of water from that portion of Lake Erie and the Niagara river down to Niagara Falls, in the preparation for the trial of this case, which promised to be contested very closely on both sides. I found that the dumping of the garbage was polluting the Niagara river very much indeed. I found another result also, which formed the basis of the argument of Prof. Franklin and others on river pollution in England. That result was, that very little reliance is to be placed on oxidation in streams. Garbage came down twenty miles, and yet there was little oxidation. I do not think that any city is warranted in depending to any extent whatever upon the oxidation of the gases, if the water is used for household purposes.

It seems to me to be entirely a question of how best to dispose of it on land, whether by fire, by extracting, or by other means. At one time it became the province of the health authorities to visit the different crematories throughout the country, and the report of that committee was decidedly in favor of the crematories existing at that time. I believe there have been some mechanical difficulties overcome since then, but this extraction plan has been constructed, and the Buffalo authorities are entirely satisfied with it. It has done the work, whether economically or expensively I have no idea; but it does not produce any noxious vapors as the crematories do; there is no effluvium given off. I have examined the refuse as it flows into our sewers, and it does not contain so much organic matter as our sewers themselves do, and not so much as comes into the sewers of London.

Mr. Fleischmann.—Mr. President, there has been a great deal said about the proper solution of the garbage question. If I should come before this assemblage, I should surely recommend my own process, the Merz. I have no doubt that destruction by fire, until something else is invented to take its place, is the best, until it shall have been superseded by something which will work better. There are eight cities to-day in the United States which have adopted the new system of disposing of garbage. I will state to you where is the difference between our system and other systems. We are saving, we give back to the Mother Earth, what other people destroy by cremation, and we do it as a thorough sanitary measure. One gentleman has said he would like to know if the night-soil could be disposed of. That is only a matter of expense; and all night-soil should be disposed of in some way. Here are the cities of Chicago, Detroit, Denver, Milwaukee, St. Paul, and Buffalo, all having adopted our plan, and built it in places where crematories have been in existence before, and in some of these places where I have placed my new system I have these crematories beside it. Some of the people who have investigated our system have asked where is the saving. In answer to that I will say, the city of Detroit pays $35,000 a year for the disposal of garbage. The contract says that I shall collect about 8,000 tons a year. Whatever I collect over 8,000 tons a year I refund to the city of Detroit ninety cents a ton. As the city grows I shall make about 16,000 or 20,000 tons a year, for which our corporation will pay the city. We do the work. We clean the city. Our success depends upon the quantity of garbage we get. The more garbage we get the better it is for our company, the better it is for the city. We are interested to clean the city from every particle of nuisance, because all this has considerable value.

I do not pretend, Mr. President, to come before this Association and say that I am a philanthropist, that I want to do all this for glory. I do not intend to clean any city in the United States for glory, but I do intend to clean the city, and I will show how the product which comes out of this process can be utilized. I wish it distinctly understood that I am not in any competition with crematories whatever. A crematory, though it may be very good, is a waste. I will show this to you, and will substantiate the fact. Here is the product [exhibiting a sample in a bottle] from my works in the city of Milwaukee, and I have two crematories beside us there, which I bought out from the board of health, paying for them $22,500. I put my plant up next to these crematories for the simple reason that I wanted to find out, first, if my plant is big enough to take care of all this garbage. There is a little misunderstanding here. Some people think that ten, fifteen, twenty, or twenty-five tons of garbage is a very small quantity. I have thirty-four wagons running, and each wagon collects four loads a day, which gives me about sixty tons of garbage, and if you should come up there and see the amount of garbage which is to be destroyed, you would be astonished. The health commissioner of Milwaukee over-flooded me with garbage, because I was not prepared to take care of so much. I used the crematories, and I thought they were a very good thing. I could show you from my book that I destroyed only about seventeen tons of garbage a day, and it cost me $850 a month to run those two crematories. The straw which comes from commission houses in our city has a little oil in it, and burns itself. I do not need any crematory for that; but when it came to regular garbage, I found that every day the fire was put out in the crematory. I could not burn it. I think my process is the best, and I will leave that to the Health Association to decide in the future.

Here, ladies and gentlemen, is a sample of the garbage just as it comes out of the dryer [exhibiting a bottle]. I wish to state that the odor from it is very inoffensive, and I will leave that to yourself to test [passing around the bottle]. This material contains from ten to eighteen per cent. of creosine. Here is another sample from the second process, which contains about 4½ ounces of alum. Bone phosphate and potash, and all other products, are valuable; and here comes in my economical point: the economy comes in investing the money and getting a good return, and yet not getting any compensation from the city. If I could get the garbage from the city of New York, I should be perfectly willing to pay a compensation for it. One hundred tons of garbage contain 65 tons of moisture. That leaves thirty-five per cent. of valuable product. Out of this thirty-five per cent. there is ten per cent. of grease, and the balance is valuable fertilizer.

I wish to state in regard to night-soil, and I think there are gentlemen here who will support me: the health commissioner of Denver is one. I made a contract with the city of Denver to take care of their garbage and also of five tons of night-soil a day.

The PRESIDENT.—It is with the understanding that there are several speakers who wish to address the meeting on this subject that the Chair proposes, in virtue of the authority given him under the rules and regulations, to limit the time of each speaker to five minutes.

Dr. KILVINGTON.—Mr. President, I feel very much interested in this subject, and I am aware that these plants are in existence in Buffalo, Milwaukee, and in Chicago. We have heard what has been said concerning the system in Milwaukee, and have heard the able remarks of Dr. Clark, of Buffalo, seconded by the city chemist, and of Mr. Fleischmann, the patentee of the Merz system. I should like to hear from the city of Chicago. We have here Mr. Young, who is in connection with the health board there. I should like to hear his experience in that city.

Mr. YOUNG.—Mr. President, I did not expect to be called on in relation to this matter, nor am I aware that Chicago has adopted any method for the disposal of garbage, either the Merz method or any other method whatsoever. There is an establishment under the Merz patent located in Chicago, and as health officers we have a great many complaints from the people residing in its vicinity of the odors arising therefrom. As to its success in other cities I know not. Our idea, after consultation with my superior officer, is to carry the garbage outside of the city by rail, and dispose of it there by cremation or any other process, so that it will not be offensive to our citizens. That is all I have to say.

Mr. Fleischmann.—Mr. President, may I ask whether the gentleman knows if the complaints there arise from persons who simply object. Some people always have an objection to make to any progressive movement, objecting to the simple fact of anything of that kind being established in their neighborhood; or whether he knows from actual observation that there is an odor arising from that plant.

Mr. Young.—The health officer has to take cognizance of any complaint. We have many complaints from people residing in the vicinity.

Dr. A. A. Clough, of Denver.—Mr. President, I wish to say that I think the fact that complaints come from the neighborhood of this establishment carries no weight whatever. In Denver, as soon as the board of health had determined upon a site near the river—no sooner had we decided upon that, than numerous complaints came, petitions as long as your arm, and using all the arguments possible to prevent an establishlishment of that kind being placed there, of which the petitioners knew nothing whatever. So that before they knew of this, whether it would be a nuisance or not, they began to complain. The fact of a crematory, or an extractor, or anything of that kind being located in a certain neighborhood is believed to be an injury to property in that neighborhood, diminishing the value of it. It is on that account that the objection has come, more than that it is a real offence. As a member of the committee sent from Denver to investigate the different processes for disposing of city garbage, I visited these institutions in Chicago, and I will state that I was not aware, standing in the street directly opposite this building, that anything of the kind was being carried on within. In passing through the establishment—there were several tons of rotten fish being disposed of by this process—there was no more odor in that building, or in any portion of it, than you would find in a candle factory or soap factory. Except in the room where these substances were deposited, and except in the transportation of garbage through the factory, I have discovered no sort of nuisance. After it reaches the factory, I think there is no more sanitary way of disposing of it.

Dr. Kilvington.—Mr. President, I can assure you that it is a great pleasure that I have again the opportunity of speaking on this subject. I anticipated an opportunity to define my position. I am a rigid believer in fire for the destruction of all organic matter, and venture the assertion that within ten years of this date your cemeteries will be a thing of the past. If it is good to dispose of animals in this way, then it would be good to dispose of refuse resulting from human life in this way. When I first started out on this investigation in the city of Minneapolis, we were then dumping into the Mississippi river some 1,500 loads of garbage and refuse matter a day. We had within the precincts of the city of Minneapolis an oleomargarine factory, where they made different sorts of hair oil, different forms of extracts, lard oil, olive oil, and all such fat and materials as this from dead animals—glandered horses, dead dogs, and animals killed *in transitu* from the Western territories. These places were where we were disposing of our dead animals. The city of St. Paul had established within our precincts a dump for the disposition of fat and offal from slaughter-houses. The residents complained of this, and, as health officer, I was compelled to take cognizance of their complaint. I was at a loss to know what to do. I had already studied crematories in Europe. I visited over one hundred cities in the United States, with a view to obtaining information relative to disposing of the garbage in this country. I was surprised to find very little information. I met Dr. DeWolf, of Chicago, who introduced the Mann system in Milwaukee and different cities, and advocated the plants they were using, and I was shown an apparatus that was in use in Montreal. I was convinced that organic matter could be destroyed by fire, and economically destroyed. During my observations I found that the expense of running these different plants varied in proportion to the intelligence of those who were constructing the apparatus. In one instance they were burning from six to eight tons of coal for the destruction of about as much garbage. In another instance I found them utilizing refuse in front of the furnace for fuel, and destroying the other by contact with it. I made a proposition to build a furnace in the city of Minneapolis, of the style having a secondary fire. I fixed upon that kind simply because it had this secondary fire for the destruction of garbage. I proceeded to build one for the city of Minneapolis, without charging any royalty for it. On the completion of this plant I received a call from Dr. Miner, of Milwaukee, who was very much interested in its operations, and made way for the placing of one in the city of Milwaukee. The contractor desired that I should superintend its construction and build it like the one I had modelled, and superintend the plant. When it came to purchasing the material, they thought they could do better than I could, and undertook to do it. The result was some misconnection. About that time I was invited to deliver a lecture at West Superior, Wis., and I could not give much attention to matters at home. So I let the matter drop. The contract stands, and nothing has been done.

The PRESIDENT.—The Chair must warn the speakers that the time allotted to them has drawn to a close.

It was moved, and duly seconded and carried, that the gentleman be allowed to finish.

Dr. KILVINGTON.—Being deeply interested in the welfare of my city, I felt it was my duty to protect their interests in this matter. In coming in contact with other municipal governments, I felt the mistake of health officers' plunging their cities into expense, and the cities getting small return for it. One city built a furnace for $11,000, and had to sell it afterwards for $100. It requires practical, experienced men to build and superintend the handling of this matter. The sanitarian may be a success as a sanitarian, but not as a physician. The physician many times, though he has studied preventive medicine, cannot practise it;

and we know that some of our ablest students in medical colleges, who can answer any question, and can deliver a lecture almost the moment after they have heard it, as the professor gave it, cannot succeed in practising medicine. No man should attempt to do anything he does not understand. In following out the line I have started upon in protecting the pocket-books of the public in the city of Minneapolis, I began to be opposed to the contract system; and I am thoroughly convinced that I am right to-day. The city of Minneapolis for $25 issues a license, which permits the purchaser to carry on the scavenger business provided he lives up to the requirements of the department of health, which are very strict. They cannot remove one pound of material from one part of the city to another without receiving a permit from the city, which dictates when and where they shall take it and at what time. The result of giving these permits is now being shown. If a man starts out to clean a vault, we know it. If he drops material, we know it. We know the condition of the apparatus on the arrival at the dumping-place. Our object is, that the people of our cities shall not be taxed for the gathering of this garbage, and the disposition of it, when many of them do not make any garbage. I believe in making the man who makes the garbage pay for the disposing of it. I do not believe it is right to tax one man for the disposition of another man's garbage, nor for the municipal government to do it. I challenge any one to find a cleaner city than that city. We can show a remarkable reduction in the amount of garbage in that city from heretofore. If you will go and see what we have there, you will see that we have no garbage, because we have educated the public.

The department which I have the honor to represent has educated the public to dispose of the garbage in their homes. You cannot go along our streets and see pails and buckets and boxes of filth, as you do in other cities, where they have this contract system of collecting garbage. One wagon comes for the garbage, another for the ashes; and you are constantly having filth spilt. If you wish to see this, go to Chicago. We make the people dispose of it and take care of it. The city of Minneapolis last year did not give me one dollar to carry on that business. I asked them for $5,000 to run a crematory, and the decision was against me, because I simply asked for so small an amount. If I had asked for $50,000, I probably should have got it, because people are running after big jobs. I had $18,000 to carry on my department. The city covers sixty-three square miles, 216,000 population, and I challenge any one to show a cleaner city.

A Member.—I suggest that the discussion be kept to the question of furnaces.

The President.—I must now inform the speakers that the few extra moments allowed have expired.

Dr. Albert L. Gihon, U. S. N.—Mr. President, the time is very short. We have not time enough to go all around the cities of the Union, to say nothing of those of Canada; nor have we time enough to continue this drawn battle. One opponent is down, and the other one is up; and it might be long drawn out. This Association is not merely the place for the expression of personal opinion. Some years ago we determined upon a method of instructing the people, which is the object of the Association. We therefore created certain committees, and those committees were instructed to examine exhaustively into the subject, and then to report to the Association something that would prevent the recurrence of the trouble. How well that has been done by one committee, the Committee on Disinfectants, is known to you. Their report is authoritative, and quoted in every country on the face of the earth. Some three years ago we created a Committee on the Disposal of Garbage. That committee has not reported as it should have done. I move, therefore, that the discussion be stopped, and that the matter be referred back to the Committee on the Disposal of Garbage, with instructions to report at the next meeting, with the understanding that that report shall include the literary history of the whole question; and that it be given to us in such form that it may be put into pamphlet shape and sent abroad. I offer the following:

Resolved, That the Committee on the Disposal of Garbage be continued, with the change of title to the Committee on the Disposal of Garbage and Refuse, and with the addition of another member.

I hope they will feel a sufficient ambition to rival the excellent work on the part of the other committee, and do something that the Association will be proud of.

The PRESIDENT.—Dr. Wells, who was not present at this morning's session, is now here, and will make a brief announcement, which will not detain you long.

Dr. HENRY M. WELLS, U. S. N.—Mr. President, members of the Association, Gentlemen: I have here some circulars, issued by the surgeon-general of the navy six years ago, announcing the establishment of a museum of hygiene in Washington. I am sorry to say that it is not generally known throughout the country. When the American Medical Association met at Washington last year, I was surprised to find how few of the delegates there knew anything about the existence of the museum. After I had brought the fact to their knowledge, we were daily visited by the delegates, and they expressed their surprise at what had been done in the short period of our existence. I now leave these circulars here with the hope that you will each take one, as far as they will go, and read them carefully, and see what we have. We are the only museum of this character in this country. Only about six months ago one was established in the University of Pennsylvania. We are trying to build up a museum there, to be a credit to the country. We have an exhibit room, where we have several hundred exhibits, and a library of over fifteen thousand volumes. We have a chemical laboratory, a biological laboratory, and a microscopical department in complete working order; and we shall be very glad to see all the delegates whenever they come to Washington. The number is 1707 New York avenue, very near the Army and Navy Building.

The PRESIDENT.—Dr. Raymond, in his absence, desires me to offer the following resolution:

Resolved, That it be the duty of the Secretary to arrange for the transportation of members to and from the annual meeting of the Association, and to issue the transportation circulars.

I am asked to remind you that the meeting this afternoon will be held at the Hoagland Laboratory at 3 o'clock. Dr. Sternberg has agreed to be present there at 2:30 o'clock, so that he can show the laboratory, to those who wish to see it, before the business of the meeting begins.

On motion duly seconded, the meeting adjourned to meet in the afternoon at the Hoagland Laboratory at 3 o'clock.

AFTERNOON SESSION.—3:10 *O'CLOCK.*

HOAGLAND LABORATORY, BROOKLYN.

(Vice-President Montizambert in the chair.)

The CHAIRMAN.—The Association will please come to order.

The first paper on the programme this afternoon is on "The Prevention and Restriction of Tuberculosis in Man," by Edward Playter, M. D., Ottawa, Canada. (See page 122.)

The CHAIRMAN.—The discussion on this paper will be deferred until after the reading of the next paper, which is upon a kindred subject, "Notes on the Prevention of Pulmonary Consumption," by P. H. Kretzschmar, M. D., Brooklyn, N. Y. (See page 128.)

Dr. KRETZSCHMAR.—Mr. President, ladies and gentlemen, when I read my paper, I should like to have this specimen flask go round for inspection. The properties of the flask will be mentioned in this paper. It has been invented by my friend, Dr. Detwiler, of Frankenstein, Germany, and it is in the general list of the Medical Congress in Wiesbaden. It is intended to be used by all people who cough and expectorate. It is made of glass, in funnel shape, with a little water in it, and the expectoration is received in the glass. There is an opening in it, so it can be washed and cleaned. I will pass it around so as to give every one an opportunity to examine it.

The CHAIRMAN.—The discussion on the last two papers, together with that of Dr. Hunt, read at the morning session yesterday, on the same subject, will now be in order. If any gentleman present wishes to speak on these subjects, he can do so; if not, we will proceed to the next item on the programme.

After a considerable pause, there being no indication of a desire to speak, Dr. Kretzschmar said,—

Dr. KRETZSCHMAR.—Mr. President, before we proceed, I should like to invite all members of the Association to discuss this most important subject. I think there are statements presented in both these papers which are not approved by all. I think it would be interesting and beneficial to discuss these papers. I am ready to defend mine, but I would like some one to attack it first.

Dr. Hibberd.—Mr. President, simply by way of opening the debate, not wishing to discuss the subject at large, I will say a word or two, in reference to a point raised in all the papers that have been read.

There are just two points that are to be observed in preventing people from having tubercular consumption. The first is, to keep them from contact with the cause of the disease; and the second is, to render them invulnerable to the attack when it does come. Now those two points cover the entire ground in relation to prevention of phthisis. I had the honor to call attention, day before yesterday, more particularly to that part of this programme which bears upon the subject of cultivating the proper attention to the development of the human system, so that when tubercular consumption and other diseases attack us, we shall be able to resist any impression upon our systems. It is alluded to in all of these papers. I think it has been stated that there is no possibility for all persons, at least in this latitude, with our warm houses and our meetings in various buildings—it is utterly impossible that we can be, at all times, completely exempt from a liability to receive this bacillus tuberculosis. It is true that this effective agent may come to you under such conditions and under such unfavorable circumstances that it makes no impression upon you; but it certainly may come sometime, in its full strength, in its vigor, when it will find something upon which to propagate itself. It may be a weak lung derived from parents, or it may be from some portion of the system derived from healthy parents. It may come in any time in life, but it is particularly liable to come in youth. The only point I wanted to speak of is one that has been mentioned in my paper. One of the means of invigorating the system is to be careful that we do not weaken it. We all admit that our unventilated houses and overheated houses are among the most fruitful causes of our liability to this and other diseases.

Dr. Playter.—Mr. President, I should like to say a word in reference to the point raised in regard to heredity. I was, of course, a little surprised that my friend, who has read the last paper, should lay so much stress on the point of heredity. I have never seen, and I think there has never yet been, any illustration given of heredity in consumption. I do not believe that tuberculosis will descend from a mother to the child. We might just as well say that other children's diseases were hereditary. How many cases of scarlet-fever, small-pox, or measles can we find, in which the children's grandparents and all their relatives had not been afflicted in the same way? I do not think, from a scientific investigation, that there will be found much more occasion to believe in hereditary causes for this disease than for these other infantile diseases.

Except in so far as I endeavored to mention, I did not attempt to go into any of the details in regard to heredity, except as relates to contracted diseases. I had thought that was so universally believed that there would be no question about it. I may be entirely wrong, but I had thought that the question of heredity was not now very much held by the medical profession.

I have listened, with a very great deal of interest, to the paper which has been read by my learned friend, and some of the points are certainly new; but they are not followed by statistics as regards the parentage and ages of children, which would explain in what way those children inherited this tendency—that it is not a malformation of the human subject.

Dr. KRETZSCHMAR.—In answer, I simply wish to say this: We differ principally on that one subject. The speaker said that the patient has small lungs, and I say that the patient has large lungs with a small heart. The speaker admits that the chest is contracted, but a contracted chest and a long chest make the condition which I state. It is a contracted chest which contains lungs large in proportion to the heart, and the heart is not able to perform the duty of nourishing the lungs properly, to properly aerate the blood. That is one part of tuberculosis disposition. As regards the statement that I did not give the statistics, I took out of five hundred and six cases as small a proportion as possible. Twenty-nine per cent. of those cases were taken from families having healthy parents, and the twenty-nine per cent. were all children of the same sex, the same family. I simply want to establish and claim the mode of developing the disposition in previously healthy families.

Dr. EDWARD PLAYTER, of Ottawa, Ont.—I did not mean statistics in reference to inheriting the tendency, but only alluded to that point in reference to the children at a low period of life—those born low in life. I should just like to say that the heart is of such small capacity, as compared with the lungs, that, in the small chest, it seems to me the smallness of the heart would hardly account for the smaller chest generally.

Dr. JOHN O. WEBSTER, of Augusta, Me.—Mr. President, I do not rise to dispute the question, but simply to say, in regard to Dr. Playter's paper, that the state board of health has already followed his advice in issuing a preventive-disease circular in regard to consumption, in which it not only enforces the subject of guarding against infection from the dry sputa, but also takes up the other subject mentioned, and recommends the enlargement of the lungs by exercise. I have no doubt it is a very valuable suggestion.

The CHAIRMAN.—The next paper is a paper on "Disinfection of Dwellings by means of Sulphur Dioxide," by Cyrus Edson, M. D., chief inspector of the New York Health Department. (See page 65.)

Dr. STERNBERG.—Mr. President, gentlemen, I simply wish to call the attention of the members of the Association to the fact that experiments, made by the Committee on Disinfectants, of this Association, on vaccine virus in this city some years ago, fully sustained the conclusion arrived at here, with reference to the power of sulphur dioxide to destroy the potency of vaccine virus. I made experiments as long ago as 1880, in which I exposed ivory slips with vaccine virus in bell glasses, containing a given quantity of sulphur dioxide, carefully measured. My recollection is that one per cent. in the presence of moisture was effective in twenty-four hours. I won't be exact as to figures. I made quite numerous experiments, exposing the points, and keeping some of the same lot without exposing them, and vaccinating children in one arm with the disinfected point, and in the other with the non-disinfected point. The result was that both sulphur dioxide and chlorine had the same effect in destroying the infected part—negative results from the disinfected, and positive results from the other. So that the results obtained in practice in New York correspond with the experimental evidence. But it will not do to generalize from this, because we have very exact experiments to show that sulphur dioxide, in any such proportion as is commonly used, will destroy certain well known disease germs. After the question of destroying the micrococcus or the streptococcus of erysipelas, various other organisms have been exposed by myself and various experimenters in Europe to sulphur dioxide, in a much greater percentage than is usually employed in efforts of disinfection, with unsatisfactory results. But in this class of diseases—small-pox, yellow-fever, measles—in which a specific micro-organism has not been demonstrated, certainly we must be guided by the practical experience of sanitarians. As stated by the author in this paper, it is entirely in favor of the view that it is a very useful agent. The Committee on Disinfectants of this Association has recommended its use, but they, at the same time, insist upon other measures,—the disinfecting of premises by washing with various disinfecting solutions, or hot water, and so on, and especially thorough cleaning of premises with hot water.

Dr. C. A. Lindsley.—This is a very practical subject, and one in which every health officer in the Association will be interested,—how to prevent the spread of infectious diseases by disinfectants; and it is one practical questions I am very glad to know about, in the experience of the author of the paper, Dr. Edson. I would like to know something of the details of this method, whether he takes any precautions to have the atmosphere excluded from the surface intended to be disinfected, or from the surface previously moistened.

A recent paper by Dr. ——— points out what he claims to be the immense difference between the sulphur fumes used when the atmosphere, or the places to be disinfected, are dry, and when previously moistened. I should like to know what the practice was in New York in the experiment.

Dr. Hibberd.—Please tell us, also, whether he uses any different methods from those recommended by the committee for producing the sulphur dioxide.

Dr. Edson.—In answer to the first question: We have never used any moisture in connection with the agent. On one or two occasions we tried moistening the wall, but found the result destructive. The sulphur seemed to unite with the water and form an acid. I think that is the chemical reaction.

In regard to the other question, we used alcohol commonly, with a hot coal to start the flame, using the flowers of sulphur and stick, mixed in about one third flowers to two thirds of the stick.

Dr. HIBBERD.—Can you disinfect a room in a tenement house, the other rooms occupied?

Dr. EDSON.—No, sir; we require the family to move out for about two hours. Our general practice in a tenement house, where a whole floor is occupied, is to disinfect the entire floor.

Dr. HIBBERD.—Do you not have to be sure that there are no openings or cracks?

Dr. EDSON.—We cannot be certain.

Dr. HIBBERD.—Is n't it conceded that it gets heavier than the air as it cools?

Dr. EDSON.—We find in practice that it does not seem to affect the lower rooms as much as it does the upper ones. It is simply a question of practical experience.

Mr. HENRY R. GRAY, of Montreal, P. Q.—The experience of the Board of Health of the city of Montreal entirely coincides with the paper just read by Dr. Edson. The excellent paper by Dr. Edson interested me very much. The experience of our board of health, and a very great experience we have had, particularly in connection with small-pox, coincides with the summing up by Dr. Edson in regard to the efficacy of sulphurous acid gas in destroying the germs of small-pox. The medical health officer has also performed laboratory experiments coinciding with the use of it. It was the only disinfectant which we employed during our fearful epidemic in Montreal, and the fact that that epidemic was entirely killed, entirely stamped out in six months, when it at one time ran to the extent of fifty or sixty deaths a day, the houses on every street filled with infected cases, prior to the building of our magnificent hospital—the fact that the epidemic was controlled in six months, I think, must argue in favor of the efficacy of the sulphurous acid system of disinfection in small-pox. Of course, on these matters, I can also speak from a practical stand-point, and I think the experience of the board of health in Montreal has been similar to the experience of Dr. Edson.

With regard to its failure, to some extent, in diphtheria, I have known cases of diphtheria that have broken out within ten days or two weeks of disinfection after diphtheria; but, on the contrary, we have had a great number of cases where the disease has not reappeared. The family had returned to the rooms, and little children, who are particularly liable to contract the disease, had not taken the disease afterwards. This would indicate that sulphur, in some measure, is a disinfectant for diphtheria also, but not in all cases. It is a question for the scientists to decide; but, so far as small-pox is concerned, I fully agree with Dr. Edson that sulphurous acid gas is the disinfectant. As to the use of water, the same trouble occurs in Montreal. We attempted to use water in connection with the gas. We found that by putting the vessel in which the sulphur is burned in water to a certain depth, it heated the water sufficiently to allow a certain amount of steam to escape. Possibly this may have acted in the way mentioned by Dr. Edson in his paper on the subject, but when we came to moisten or spray the surface, the destruction to the property of the poor people was very great—the spoiling of the walls and other things—and we did not notice any better results arising from that method.

Dr. RAYMOND.—Mr. President, the subject of sulphur fumigation seems to be undergoing a sort of reaction at the present time. There was a time when sulphur fumigation was relied upon to the exclusion of almost all other methods of fumigation. Fumigation by chloride, being so destructive, has practically to be ignored in ordinary house fumigation. Then came a time when every one—certainly those who pay much attention to it—believed that sulphur fumigation alone was sufficient. Now, again, the reaction has occurred, and sulphur fumigation seems to be coming in vogue. There is no doubt that a great service has been done in calling attention to the fact that sulphur fumigation must be carried on in the presence of moisture. Since the paper was read I have taken occasion to refer to the directions given by various boards of health throughout the country, and wherever the use of water has been recommended it has been done almost invariably simply as a means to prevent the spread of combustion to the surrounding materials—the carpet on the floor. Some of the boards of health, as far as I know, in their circulars, direct special attention to the necessity for the presence of moisture. The boards of health are at fault in this regard, because the attention of the physician has been called to the necessity of moisture in order that the sulphur fumigation may be successful. The experiments already referred to, where vaccine virus was destroyed by the action of sulphur, those of Dr. Sternberg, distinctly called attention to the different action of sulphur dioxide upon dry surfaces and upon moist, and he gave statistics showing a very much larger amount of sulphur dioxide to be requisite to destroy the vitality of vaccine virus when it was dry than when it was in the moist condition, and if members of boards of health would take the trouble to look properly through the instructions and conclusions of the Committee on Disinfection, they will see this phrase occurring over and over again,—" in the presence of moisture," " in the presence of moisture."

The experiments in small-pox seem to me to leave out of consideration one very important point. It would be very significant if we could know how many susceptible children—unvaccinated persons—were placed in these rooms where small-pox had occurred, and no return of the disease had occurred. I presume none of us would care to try that experiment. We must also bear in mind that every health officer not only fumigates the premises where small-pox exists, but vaccinates all susceptible persons; and where there were any cases of small-pox, and a second case does not occur, we must always bear in mind that somewhat of that escape from the small-pox may possibly be due to that prevention, and not to sulphur fumigation alone.

In the case of these other diseases, we have a number of cases, in one case something like one hundred and twenty-two. In the case of measles, where there were two hundred and fifty original cases, one hundred and twenty-two cases of return, and within so short a time after the appearance of the first cases that it led to the inference that these second cases came from exposure, and not from the infected premises. Then came the smaller proportion of cases contracted beyond the possible period of protection from the first case, and presumably due to the infected premises. Here another point occurs to the mind: All those persons who did not take it when exposed to the first case, were probably unsusceptible, and therefore a smaller percentage would naturally occur. How different it would be, if, in these premises, other children were placed not susceptible to the first case. If that experiment were tried, it would, perhaps, be right for us to say that sulphur fumigation entirely destroyed the virus. I should like to know how long these experiments have been kept under observation. I know how difficult it is in a large city to keep any individual house under observation. When we have, as they have, I believe, in New York city, a record of each house, and are able to trace that house for a long period of time, then these statistics are very reliable; but where, as in most cities, the moment a case of contagious disease occurs the inspector goes there, and the case is followed up until it has recovered or died, when the place is fumigated, that house passes out of the mind of the inspector until another case occurs, and then he probably forgets that it was in that house that the other case took place.

Mr. GRAY.—Have they in New York a record of these houses, and are there statistics of non-recurrence in houses where the contagious diseases have existed, or where, for instance, they have been followed up for a sufficient length of time for the fumigating to be tested—statistics sufficient to warrant the statement that no cases occurred in susceptible children, or children presumably susceptible, who have not previously had this disease?

Dr. EDSON.—I am very glad to answer that question. We have a very complete record, exactly such as you describe. Every house in New York has its sanitary history taken for about three years back. Every case of contagious disease in that house is carefully followed by the sanitary inspector, whose duty it is to watch these houses carefully. I think our system is as complete as we could possibly have it. The law is rigidly enforced, and applied to at least ninety-five per cent. of the cases occurring in New York, the diagnosis of which is reported to us as contagious.

An important point occurs to me with regard to the use of moistures. There is no question that moisture enhances the effect of SO_2, but I have had an unfortunate experience in that direction. I had five hundred pairs of children's trousers given me to fumigate, and put them all in a large boiler-iron cylinder, connected with a large steam pipe. The sulphur was first liberated in the machine, the trousers being hung up, and then a very small amount of steam was turned on. The result was that every single garment was ruined, and I was sued for damages.

In regard to the question asked a moment ago about the sulphur fumes failing to rise, it has occurred to me that this is due to the fact that draughts in a high tenement house are upward. The rarified air of the house ascends from below, through the opening, toward the upper part of the house, and it is sufficient to carry the fumes of the sulphur to the upper rooms, although they are heavier than the air.

Dr. P. H. BRYCE.—Mr. President, Gentlemen, I am very glad indeed, and I think the Association will thank Dr. Raymond, for the points he has introduced in connection with this matter. It seems to me that while we have shown that statistics are extremely valuable, a very plain question has been put to us health officers. Are we going away from this meeting, after hearing these statistics read and formally announced in our midst, claiming that two hours of sulphur dioxide fumes in a room will be sufficient to cause the disinfecting of the infection which may have accumulated there during four or five or six weeks of scarlet-fever or measles? I think, while it is true—and from a large amount of personal experience I can say it is true—that, with moisture, sulphur dioxide is able to clear out small-pox in a house, yet I have still to remember what Dr. Raymond has said that sulphur dioxide fumes seem to be especially injurious to small-pox virus. In all the cases where our experience has been extensive, the effect has been neutralized by the fact, as Dr. Raymond has stated, that simple vaccination has been general. If we are to hold the idea that sulphur fumes in two hours' time will destroy this virus, then the matter of disinfection is very easy. But I think we must fairly admit,—either Dr. Edson or any one who puts forward such claims, —that there are very many more details with regard to the way in which he has handled the various articles inspected,—the amount of sulphur fumes which have been, in the first place, given out in the room for these two hours; and a large number of other particulars,—scraping down of rooms, the flooring, ceilings, and walls. All these details should be taken into consideration before we ought, as health officers, to accept any conclusion apparently fairly arrived at from statistics which will lead us to suppose that sulphur dioxide will do all that Dr. Edson claimed for it. I think it will be in the interest of our work if we are very slow to assume anything of the kind.

Dr. MAXWELL.—Mr. President, I am very glad to hear the remarks of the last speaker. I purposed rising to ask if this Association is to commit itself solely to the doctrine of the paper read. I say this, sir, in view of the fact that three of the most enlightened governments of Europe, after faithful and careful trial, have abandoned the fumes of burning sulphur as a disinfectant, viz., Germany, Austria, and Russia. In France it is used, but in a manner much more thorough than that which has been recommended. Dr. ——— says that these governments I have named have abandoned it, and it is because they have not been as thorough and as careful in their experimentations as they ought to have been; and he then explains the minuteness of the manner in which he proceeds, and the details are very remarkable. He ascertains the dimensions of the room, apportions the amount of sulphur to the amount of air of the room, has his men thoroughly trained, places paper over all the carpets in the dwelling, makes his room perfectly close and impervious to air, and then he burns his sulphur twenty-four hours. After that, he thinks possibly it may be safe to regard the room and its contents as disinfected. We have the same experience in Florida in the matter of disinfection with sulphur dioxide in reference to yellow-fever. There was an epidemic of yellow-fever in Tampa and in Plant City in 1887. It is, perhaps, not generally known, that the governor of Florida—and, I think, assisted by the coöperation of the Marine Hospital Service—employed the most intelligent physician, in my judgment, in the state of Florida, the most thorough and careful conductor of experiments which are placed in his hands. He was considered to have thoroughly disinfected Tampa and Plant City. I passed through Tampa on my way to Havana in the month of February, 1888. The smell of the fumes of sulphur was everywhere. The houses were absolutely offensive. The hotels at which I stayed also smelled of it. But it is universally known that yellow-fever was not exterminated, and did not disappear from either of those cities. They were the first experiments with sulphur dioxide ever made in Florida. As far as my information extends, it was, in both cases, a complete failure. I think I was informed by a gentleman from Memphis that the same thing was tried in Memphis in the winter of 1878, and we all know of the disastrous epidemic which prevailed in that city the next winter. That has been tried in Memphis for years. Last winter it was tried in Jacksonville, and I was told the method there employed is efficient. As the gentleman who just preceded me remarks, it is the simplest and the easiest thing in the world to destroy the germs of disease. There the rooms were scarcely closed, burning the sulphur by an ignorant person, and closing the house or the rooms for ten minutes, with a little sprinkling of bichlorate. It has been claimed that Jacksonville was saved from this epidemic. If such work as that can accomplish this, it is the easiest thing in the world to prevent a recurrence of infectious disease; but, as I said at the beginning, in view of the fact that two of the most enlightened governments, in the matter of hygiene, on the Continent have abandoned it after trial, and in view of the fact that another of the most enlightened governments, viz., France, employed it only under those most careful circumstances which I have mentioned, and that then the sulphur was burned not two, but twenty-four, hours, it stands this Association in hand to admit the results, as claimed, with great caution. [Applause.]

Dr. Raymond.—I will call the attention of the Association, just a moment, to the report of Dr. Chapin, of Providence, the superintendent of health. During the past year he has noted a long series of cases of recurrence after sulphur fumigation—cases of yellow-fever and diphtheria. He expresses his opinion that isolation and thorough cleansing of the apartments were far more efficacious in preventing the spread of the disease than sulphur fumigation.

Mr. Gray.—May I ask if he mentions the recurrence of small-pox?

Dr. Charles V. Chapin, of Providence, R. I.—Mr. President, as Dr. Raymond has spoken of my experience, I will speak of it also. In Providence the board of aldermen did not see fit to make this disinfection compulsory. We offer it simply, and do not compel it, so that I had a chance to study the effect of sulphur fumes, studying the course of yellow-fever and diphtheria disinfected with sulphur, and also in cases which were not disinfected. I think more than half of the cases come to the office and ask for sulphur fumigation, and for two years we did that as faithfully as we could. I never was able to use moisture, for the very good reason that I had the same experience that Dr. Edson did. We had to pay damages for the injury done to furniture and clothing. I simply burned sulphur in the room, and closed it up as tightly as I could. The sulphur was used in the proportion recommended by this Association. The room is usually kept close for from four to six hours. I started out with the belief that sulphur fumigation would be effectual. I had experimented some with vaccine, with the results which others have obtained, and came to believe that SO_2 could give the same results upon other diseases. I followed it up carefully for three years. Some figures I obtained showed much more favorable results than those in other cases, but I think this was due to greater care in those directions. We disinfected only where we were asked to, and they asked only in those cases where they would be inclined to take the greatest precautions in isolation, and every other possible way. I have not the number of cases where we performed fumigation, and where children, susceptible to the disease, afterwards came back to the house. In quite a number, they were taken soon after they returned to the house.

Dr. Vandenbergh, of Buffalo.—I have been waiting to hear some chemist speak on this sulphur dioxide, but no one seems to have spoken. I want to know whether it is a matter of general information or not. It seems to be considered quite simple where the sulphur dioxide is used in the presence of moisture, H_2SO_3, simply taking out the water and forming the corrosive acid. It will settle upon any carpet or any texture about the room; and, of course, the damage is sure, and it will be considerable. So I say that any health officer who uses the sulphur dioxide in the presence of moisture ought to expect considerable damage to furniture and texture, for it will affect the coloring matter of the goods, and even enter into the texture of the fabric itself.

Dr. Raymond.—Is there not a confusion of terms when we speak of "in the presence of moisture"? It seems to be differently understood. Does it mean where the moisture is in the room—the articles themselves being dry—or with the surface of the articles moistened? The experiments made here in Brooklyn were performed by Dr. Kent, of the Brooklyn health board. They were all made in the presence of moisture. The trough in which the sulphur was burned was set upon bricks in a tub of water; but all the articles disinfected were themselves dry. The finest silks to be found in the dry-goods store of this city were suspended in the room where the experiment was made, and exposed to sulphur fumes for ten hours. At the end of that time, duplicate specimens having been retained, not exposed to the fumes, the exposed specimens and those not exposed were submitted to the best experts to be found, and, with one single exception, they were unable to tell the difference. We have tried the effect of exposure upon all sorts and kinds of material; and if there is any one thing which seems to me to be demonstrated, it is that in sulphur fumigation, conducted as I have mentioned, with the articles dry, there is absolutely no damage. The finest houses in this city—and the same is true everywhere—with the finest clothing of all kinds, the most delicate silks, have all been fumigated by sulphur; and, with one exception, we have not had any damage occur. That exception was in the case of wall paper, where the paste was of brown material. Here there was a discoloration, not amounting to destruction, but simply discoloration. Therefore, when we speak of sulphur dioxide as being used in the presence of moisture, it makes us ask whether we mean the articles themselves, or that the sulphur burned in the room is "in the presence of moisture."

The rules of the board of health, to which I refer, have reference to the use of water as protection against fire, to prevent the burning of the carpet. They put the pot in which the sulphur is burned in a tub of water. I recall no rules, given by any board of health, where it is said that this water is necessary for the proper action of the sulphur.

Dr. S. H. Durgin, of Boston, Mass.—I purposed to say one word upon the subject, but since it has been asserted that even the action upon the contagion of small-pox is doubted, I thought I would state the experience in Boston upon that subject. For more than twenty-two years all cases of small-pox treated in the city of Boston were disinfected only with the fumes of sulphur. This was followed by a complete immunity from small-pox on the part of those who have had the small-pox. It may be a question whether or not there is not, at all times, a large percentage in Boston, as well as in other cities, of those who are susceptible to the influence of small-pox contagion. Yet, whenever we have had small-pox there—and we, at one time within a few years, had an epidemic when some five or six thousand cases occurred, and when from three or four to one hundred cases were in the hospital at one time, and the clothing of the dead was always given to those who recovered and went away, with no sort of disinfection except that which was received from sulphur fumigation—this has been the practice in our city for twenty-two years, in my personal observation. If we are to assume that this clothing, disinfected by sulphur, can be worn again after it has been fumigated, and not be capable of giving out small-pox, then you must assume that there is no susceptibility within that city to small-pox, or else you must assume that the sulphur fumigation has destroyed its power of contagion. You have got to assume one or the other. There have been instances when I have allowed a very large quantity of this clothing to be worn out by patients recovered from the small-pox hospital, and which has never undergone any other treatment than sulphur fumigation.

I am aware of the popular prejudice against sulphur fumigation, and I would hold up both hands, and be as glad as anybody else, if we could find something that would take its place. I know of nothing. I have heard of no material that can actually take the place of sulphur for many dwellings. It has been stated that the rubbing of the walls with bread is a good thing. I have no doubt about it; but who, in this company, would consider it a practical thing to climb over the walls and ceilings of the great tenement houses of our large city, or through a steamship, rubbing the walls and ceilings with bread! What else has been suggested? What gas can be safely liberated in any of our houses, or even in the steamships, without danger and very great injury? or what can be used with any amount of rubbing of the surface, within the dwelling or within the steamship? It has been suggested that the goods of the house, the furniture, etc., may be taken away to some station where disinfection shall occur. That is all very well, and it may be that there is not much danger in carrying this material through the streets: there may or there may not be. Supposing there is not, and it is all right to do this, and you disinfect that amount of material: what are you going to do with what remains? You cannot carry everything from your dwelling to the disinfecting station. Something must be left: what will you do with that? Disinfection has got to take place, and if you are going to fumigate or disinfect one thing within the building, why not disinfect the whole under the same process?

It seems to me very strange that any of our great pathologists should say that there is no experimentation with this sulphur fumigation, when it is properly handled, and then, afterwards, advise its abandonment, even without suggesting something to take its place in practical work. We have their own statement to the effect that it is the germs which bear the spore which are killed. Then, too, we are to remember that in the laboratory, in the experiments performed by our bacteriologists, the sulphur is used under those conditions at a very great disadvantage. There are some advantages over the practical work in the dwelling; and there are some disadvantages in the laboratory. Some have a tight box for the sulphur dioxide produced, and there is not any waste. On the other hand, you have your infected material that is to be reached more out of the way. You have your blankets or your rugs saturated with the fluid, and then dried, possibly afterwards moistened, and the sulphur dioxide is well known not to penetrate very deeply into this material. It is not the case in the sick-room that this material is penetrated to any great depth. If the bedding and other things have been much soiled, they should be destroyed. As a rule, the surfaces are very slightly coated by this material; and it is a surface which we reach by the sulphur dioxide. I wish we might have a plainer, more distinct statement from experts as to whether, practically, we can and should abandon the use of sulphur dioxide as a disinfectant. It is a very practical question whether we shall go on in this country disinfecting dwellings with sulphur dioxide, or not. I do not know what else to use, myself. I was very glad to hear of the experience of Dr. Edson in New York city. The same experience has obtained in the city of Boston, where we have used this disinfecting material for a great many years. We have already fumigated a great many cases after scarlet-fever or diphtheria. It has been very rarely the case that scarlet-fever has returned after the disinfection. It has been the same way with diphtheria. In the last two years I have doubted the fumigation by sulphur in cases of diphtheria, for it may be a germ containing the spore, and not affected by the sulphur, such as other diseases, particularly small-pox, and we have added the scraping of the floor and walls and other hard surfaces, with a solution of bichlorate of mercury. I should likes ome pronounced opinion by the experts.

Dr. Delos Fall, of Albion, Mich.—Mr. President, it would seem to be worth while to dwell for a moment upon that phase of the question last touched upon by Dr. Raymond, as to whether this fumigation shall be conducted with the sulphur simply burning over a surface of water in a tub in which both the sulphur and the bricks upon which the pot is placed are in water; or whether the room shall be saturated by steam or moisture that shall come in contact with the texture in the room. The chemistry of that is very plain, and easy to understand. Bleaching will take place only by or through the agency of oxygen that is set free at the time, at the exact moment, of its liberation. If the water is upon the garment, the sulphur dioxide fumes will seize that water, decompose it, and set the oxygen free, and it will do its work of bleaching. If, on the other hand, the sulphur dioxide finds the water before it finds the clothing, it unites with that water, and forms the sulphurous acid, which does not have the power of decomposing the coloring matter in the cloth when it reaches it. So that if by disinfection in the presence of water we mean the simple placing of the burning sulphur over the surface of water, we have the additional and more powerful action of the sulphurous acid upon the germs without any danger of doing violence to articles of clothing or cloth of any kind. One other fact, it seems to me, is worthy of mention: by this method we can get rid, as I think your experience will demonstrate, of offensive odors due to the presence of dry sulphur dioxide. That offensive odor will linger in a house years and years, and it is a question with me which of the two evils I would rather suffer, that of the offensive odor, or to run the risk of infection from the germs of the disease. In the latter, I am quite sure there will be no odor remaining in the room when the sulphur dioxide has been reduced to sulphurous acid.

Dr. F. C. Curtis, of Albany, N. Y.—Mr. President——

The President.—This is an extremely interesting discussion, and I am very loathe to do anything to restrict it; but the hour is advancing, and I would suggest that the speakers restrict themselves to the allotted interval of five minutes.

Dr. Curtis.—I want to say but a word. I have listened to the discussion with much interest, and have heard the confirmation of my experience from one and another; and they have given what seems to have been the method and belief of the profession in regard to fumigation, by the use of the fumes of burning sulphur. My experience in connection with it, at least in regard to diphtheria, has been confirmatory of that which others have expressed; and that has been sufficient to prejudice me against it. In Albany, during the last ten or twelve years that I have had any connection with the board of health there, it has been the custom of the health authorities to use almost exclusively chlorine as a means of disinfection. I do not think that sulphur is used at all except in a domestic way. We use the fumes of chlorine for small-pox, invariably. We have had, at frequent and not remote intervals for the last two years, epidemics, the same as we get in scarlet-fever and diphtheria. We find very little result from it; and it is, to me, a matter of surprise that the use of chlorine has not been more suggested. I really would like some information as to whether it should not be suggested and used in a practical way more than it is. The report of our committee, of which Dr. Sternberg was the head, has made but little reference to that. I think the use of sulphur has occupied almost the entire attention of the profession. The men whom we send about to perform disinfection have become quite familiar with the use of this, and, as far as they are concerned, they have no discomfort or difficulty in the use of it. As far as evil effects are concerned, I think that the destruction of metals is the principal trouble met with. Of course, you can hardly strip every room used by the sick of all metallic material; but upon fabric it has little effect of a destructive or evil character. A room prepared and occupied by the sick will generally be stripped of everything possible that will be likely to be injured. As a matter of fact, we do use this as a routine and regular thing; and our experience has been, as far as it is possible to see cause and effect, that it is in every respect satisfactory.

Dr. W. E. Griffiths, of Brooklyn.—Mr. President, as one who has had to deal, in this great city of Brooklyn, with contagious diseases for something over eleven years, and who has watched the course of this work of disinfection from the time when it was first systematically instituted here, and even before that time, I should feel very sorry to see the discussion upon this subject left as it stands at present. My own experiences are very clear and very distinct. Cases of infectious disease occurring in houses before the advent of the system, at least, of systematic fumigation, were commonly followed by successive cases—in one case, I remember, where a house, after an outbreak of small-pox, was closed for a year, and reoccupied again. Small-pox broke out in that dwelling again. Of course, that was before fumigating was done. Since fumigation has been done here, it has been done thoroughly and systematically, and when it was done with the sulphurous acid it was commonly by the method detailed by Dr. Raymond, placing the vessel containing the sulphur and the brimstone in an iron pot, and that set upon bricks in a pan of water. Where that process has been carried out thoroughly and systematically, according to the rules laid down by the committee of this Public Health Association, using a certain amount of sulphur-dioxide to each cubic foot of space, we have had every reason to believe that it has been effective in preventing the further development of disease in apartments and dwellings so fumigated. In the case of diphtheria, I can hardly add anything to the present experience; but I think that in diphtheria not only the immediate room, but that the entire dwelling, should be thoroughly fumigated. It seems as if there were great difficulty in isolating and keeping the disease within the apartment where the sick are placed. It would be a great misfortune if this discussion ended here, and left us all at sea, especially to those of us who have pinned our faith in the past upon sulphurous acid as a means of killing disease germs; and I join with Dr. Durgin in hoping that the gentleman to whom we look, the expert bacteriologists, will give us some further light, and try to let us go from here with definite ideas as to whether we have been all wrong all these years, or whether we shall have anything else to depend upon in future to accomplish the work which we think we have accomplished by sulphur in the past.

Dr. STERNBERG.—Mr. President, I will only say a word. The experiments of the committee with reference to dioxide of sulphur are on record in the reports of the Committee on Disinfectants. We have made recommendations in that report which I think are justified by the data given. We have recommended the use of sulphur dioxide for the disinfection of apartments and ships, because we did not feel justified in the throwing overboard of an agent which so many practical sanitarians believe in, and which may give evidence that seems to be quite satisfactory in many cases. I have already mentioned that evidence with reference to vaccine virus. It is satisfactory; and although to-day sulphur dioxide properly used is an efficient agent for the destruction of vaccine virus, and, by inference, of the small-pox poisoning, as I have already said in the diseases which have been demonstrated to be due to micro-organisms, I think the evidence is very strong in favor of the view that fumigation, as ordinarily practised, and as described by the gentleman who read the paper this evening, is a good deal of a farce. That is the opinion of biologists everywhere, and the experimental data in support of that view are on record. You will find them in our reports.

In Italy, during the cholera epidemic, it was the fashion to fumigate travellers as they passed from one place to another. They were put in the railroad station, and so great was the belief in the potency of this agent that a little sulphur was burnt in the room in which they were. Mothers, with children in their arms, went into the station, the sulphur was burned, and they went off, and I presume those gentlemen would tell you that no cholera occurred. The inference that they deduce is, that the burning of that little sulphur in the room where the persons were respiring the air is the reason for the non-appearance of the cholera. Dr. Koch was fumigated in that way when he came back from India, and he had a culture of his coma bacillus in his pocket. He carried it home and cultivated the germ. It was not affected by the fumigation. I think that in many cases the inference that because there is no recurrence of the disease it is due to the fumigation practised, is a mistaken one; and the statistics are very liable to mislead us—what else was done, how many children were exposed, and so on. Dr. Raymond has referred to that matter.

Abroad, the test of disinfection has been, I think, too severe. They have required that the disinfectant shall destroy the spores. That has been the standard. It is adopted by Koch. I do not think it necessary to adopt any such test as that, but we want an agent that will destroy the micrococcus of erysipelas, the bacillus of typhoid fever,—coma bacillus. Those are the tests for which our recommendations have been made. My judgment is that disinfection, as practised ordinarily, as practised in New York, does not destroy such organisms. You could not depend upon it.

Dr. FRANKLIN GAUNTT, of Burlington, N. J.—I will not occupy the time of the Association except for a moment, to give my experience, which may be worth something. After having practised medicine for a long time, and seen many cases of small-pox and yellow-fever at this period, and having relied upon this method of disinfecting the houses, without seeing it return into that house, I believe it should be followed up unless something better be given. We never expect to see small-pox in the house again by following this method of disinfection, nor a recurrence of diphtheria in that house treated in the same way, unless a new case comes there. It will not recur to those living in that house again. The same applies to yellow-fever. I have relied upon it for so many years, that I do not want anybody to go away with the impression that this mode of disinfecting can be abandoned unless we have something to take its place.

Dr. JOHN COVENTRY, of Windsor, Ont.—Mr. President, as a health officer, I have had some seven or eight years' experience in disinfecting houses and superintending their disinfection. I have used the sulphur pretty much as recommended. While it could be used as we wish to use it, it has almost always been successful. I have had a varied experience in carrying it out, according to our best information, in different classes of the community, as between the rich and the poor. It is a comparatively easy process to disinfect after a contagious disease in the house of a man who has a large number of rooms, and where it can be done much more systematically—where we can remove the family and they can have an entire change of clothing; remove them to a portion of the house which has not been infected—as compared with the disinfection of the poor man's family who have only one or two rooms to live in. The range of disinfectants, and of protection from disease, as we all know, has been very large, in all time reaching from the amulet to the bichlorate of mercury. In the trial of all of them, and with the consolidated experience of the profession, and the almost invariable experience of health officers, I think it has come down just to this, that the fumes of sulphur are the most ready of application.

As far as experience has gone it has filled the bill to a very large extent, and if we could only continue the fumigation for several hours longer in the families of those who have but little accommodation, I think the efficacy of the fumigation would be much greater than it is now given credit for. The practical difficulty lies in what we shall do with the family while the disinfection is going on. There are but one or two rooms in the house; you cannot turn the occupants into the street. The consequence is, we have to content ourselves with simply fumigating a room or two for an hour or two. Six hours is the invariable length of time I would have if I could get it; but the necessities of the case have frequently made it impossible that the building should be kept closed for that length of time. But the want of success that has followed I think to be due to that cause. It is a practical question, and one not easy of solution. It is the greatest difficulty in the matter of fumigation. I think that until such time as it has been pointed out that fumigation by sulphur does not accomplish what is claimed for it, and that something else that is better is introduced, this Association would do well to recommend its continuance; at least until such time as it can be shown that it has positively failed where duly carried out, or until such time as they can point out something else for health officers to use instead of it.

Dr. Plunkett.—Mr. President, I should like to ask a question of the gentleman from New York who read this paper. The subject has taken a wide scope, and there seems to be a diversity of experiences and opinions. I should like him to take a hypothetical case, and give us exactly what he does to disinfect a room,—tell us exactly how this is done by him.

Dr. Edson.—I should be very glad to answer this. On visiting a case the inspector measures the room. Take three pounds of sulphur in proportion to every cubic foot of air space, place the sulphur in a tub of water, pour on the sulphur four ounces of alcohol, light it by means of a coal or match. The presence of the sulphur in the water, and the amount of water given off by the alcohol will be very considerable. I am indebted to Dr. Parker for his figures. He estimates that four ounces of alcohol will give off about five quarts of vapor.

Dr. Raymond.—Five quarts. That is very important.

Dr. Edson.—We tried to follow out the rule formulated by you, but we sometimes neglected it, two hours being the minimum in which we open the doors.

Dr. Plunkett.—Is that all done by medical officers?

Dr. Edson.—It is done by the disinfector.

Dr. Plunkett.—Is he a medical man?

Dr. Edson.—No, sir; he is a man of very wide experience. Most of our disinfecting corps have served fifteen or twenty years.

Dr. Plunkett.—Is that all? Do you do no scraping?

Dr. Edson.—No, sir, we do not; but we intend to in the future. The object of my paper was not to prove absolutely—I recognize it does not prove—SO_2 to be perfectly reliable. It does show circumstantial evidence in favor of it. I do not think we ought to discard the whole thing for something in the future that is yet untried.

Dr. Plunkett.—Do you leave everything in the room?

Dr. Edson.—We leave everything just as it is infected. We never take down the hangings. We like to disinfect everything in the same position in which the infection reached it.

Dr. Raymond.—It seems singular that the members of the Association are not familiar with their own action. This subject was referred to a committee some years ago. The committee made its report, and that report was adopted by the Association. In this report the use of sulphur was recommended. It is not discountenanced or discouraged. Attention is merely called to the necessity for doing it in the proper way and under proper circumstances. The statement is also made, that for all diseases which are known or believed to be caused by micro-organisms, or a spore-forming germ, sulphur fumigation is ample; but where the disease is caused by a germ or bacillus, particularly where it forms cores, then other things are essential. If the members of the Association will take the trouble to read the action taken by themselves, they will find that every question raised to-day is entirely covered by the report of that committee. They will see that the observations here stated are simply confirmations of the action they had already taken.

The following resolution, offered by Dr. Rauch, was read by the Secretary:

Whereas, Asiatic cholera, leaving its usual restricted bounds, threatens to descend by the same lines that it has followed in the last four epidemics,

Resolved, That the American Public Health Association desires to call general attention to this fact, and to urge the qualified authorities on the Atlantic and Pacific seaboards, and boards of health throughout the country, to make every effort to prepare for this threatened danger.

The President.—Before any of the gentlemen leave the room the Chair would like to announce that the session this evening will be held at the Brooklyn Institute.

Meeting then adjourned.

EVENING SESSION—8 O'CLOCK.

(Vice-President Dr. Montizambert in the chair.)

The President.—The Association will please come to order. The first in order will be announcements by the Local Committee of Arrangements through Dr. Raymond, the Chairman.

Dr. Raymond.—At the suggestion of one of the members of the Local Committee, a list has been prepared of the members present at this meeting, with their addresses. This list will now be distributed throughout the audience, and I think will be of use for purposes of reference. It is complete up to last night. Some others have registered since then, and their names will now be called.

At the request of Dr. Bell, Chairman of the Committee on Exhibit, I have to announce that the Health Exhibition is now and will continue to be open from 10 A. M. to 10 P. M. After Monday next, it will be open from 3 to 10 P. M. until December 1st. Admission, of course, is free, and the attendance of all the citizens of Brooklyn is desired.

During the month of November there will be addresses made at this hall on Monday and Friday evenings. A sanitary address, in connection with the Health Exhibit, will be given. Due notice of the subjects and of the speakers will be announced through the press and also upon the bulletin of the institution.

The SECRETARY.—Mr. President, Dr. A. N. Bell, of Brooklyn, desires to offer a resolution:

Resolved, That a committee be appointed to confer with the Committee for the World's Fair in 1892, at the proper time, with a view to special provision for an exhibition of sanitary goods and devises.

The resolution will be submitted to the Executive Committee as usual.

Ths CHAIRMAN.—The first paper we are to have the pleasure of listening to this evening is "Sanitary Entombment," by Rev. Charles R. Treat, of New York city. (See page 186.)

The CHAIRMAN.—I am very confident that I am only giving expression to the feelings and wishes of this entire meeting in tendering the thanks of the Association to the Rev. Mr. Treat for his most interesting and instructive paper.

The discussion upon this subject is now open.

After a short pause, no one offering to open the discussion, the Chairman said,—

If none of the members desire to speak on this subject, we will proceed to the next paper on the programme, "Do the Sanitary Interests of the United States demand the Annexation of Cuba," by Benj. Lee, M. D., secretary of the Pennsylvania State Board of Health. (See page 47.)

Dr. LEE.—In conclusion, I would ask leave to offer the following resolution:

Resolved, That in view of the constant menace to the health of the United States from the uninterrupted presence of the most serious known contagious diseases in the island of Cuba, a condition which must continue so long as that island is a mere dependency of a country three thousand miles distant, this Association respectfully urges upon His Excellency the President of the United States the expediency of opening negotiations with the Spanish government with a view to an amicable transfer of that island to the United States.

Resolved, That in the meantime this Association, recognizing the admirable precaution taken by the United States Marine Hospital Service, and by the State Board of Health of Florida, to prevent the introduction of yellow-fever into this country, respectfully request Supervising Surgeon-General Hamilton, of the United States Marine Hospital Service, the honorable chief of the State Board of Health of Florida, and all quarantine commissioners of ports having intercourse with Cuban ports, to exercise the same vigilance with regard to leprosy that is already observed in the case of yellow-fever during what is known as the quarantine period.

Resolved, That the Secretary be instructed to transmit copies of the above resolutions to the officers therein indicated.

The CHAIRMAN.—The resolution which Dr. Lee has submitted at the end of his paper will, of course, be handed to the Executive Committee, to be by them reported back to the Association in due form.

The paper will be followed by a stereopticon exhibition of leprosy, by Prince A. Morrow, M. D., of New York.

Dr. MORROW.—Ladies and gentlemen, and members of the Association, I must beg your indulgence for the somewhat disconnected, and perhaps discursive, remarks I may make in connection with the presentation of this subject. I was not definitely informed that I should be asked to participate in these exercises till last evening, so I have prepared no notes. Before presenting these lantern-slides, illustrating not only the different forms of leprosy, but also the various phases which these different forms assume in their process of evolution, I may say a few words in regard to the geographical distribution of the disease at the present day. By the laity, and also by the immense majority of the profession, leprosy is looked upon as possessing at the present time only an historical interest. While the disease has practically disappeared in Europe, and attained to no appreciable proportions in this country, yet if we look at the geographical distribution of the disease in different parts of the world at the present day, we shall see that it extends over almost one third of the habitable surface of the globe. It prevails in the most diverse regions, it affects all nationalities, and it is not influenced in its distribution by climate, by soil, or by racial peculiarities. It is impossible to give a statistical and accurate statement of the number of lepers upon the face of the earth at the present day. In India alone there are 250,000 lepers. In China, Japan, Egypt, Africa, and in other portions of the Eastern Hemisphere, there are large numbers. The only considerable centre of leprosy in Europe within the last two or three centuries is in Norway and Sweden; but we find that there are scattered cases in many places, localized centres of the disease existing in Spain, France, Portugal, Italy, principally along the Mediterranean coast. In the Western Hemisphere, leprosy is perhaps even more prevalent. In South America—in Brazil and other portions of that country—there are a great number of cases; also in Central America and Mexico. In Canada there are two or three distinct leprous centres, the most important of which is at Tracadie. The distribution of leprosy in the United States, however, most intimately concerns us. In addition to many cases of leprosy in New York, Philadelphia, New Orleans, San Francisco, and other principal cities, we find there are distinct leprous centres in Louisiana, where the disease was carried by the Acadians; in California and Oregon, where it was carried by the Chinese; and in Illinois, Iowa, Minnesota, Wisconsin, where it was introduced by the Scandinavian colonists. We find also reports of cases along the southern Atlantic coast, at Charleston, and other points. At Key West, as indicated by the reader of the last paper, there have been reported over one hundred cases of a comparatively recent development. I neglected to say that among these leprous centres there is one at Utah, comprising a few cases, and this was due to an importation of Sandwich Islanders by the Mormons several years ago.

It was a surprise and a revelation to the medical profession, when, last year, Dr. Blanc, of New Orleans, reported the existence of forty-two cases of leprosy in that city. There was no suspicion or intimation of the existence of nearly so large a number. In addition, there are two points in the Teche River district, where leprosy has for a long time prevailed. Several cases of leprosy are also reported along the line of the Southern Pacific Railroad. In California I had reports of over twenty cases, through the president of the state board of health. A number of cases I saw in San Francisco; also in the City of Mexico, where this disease has prevailed certainly since the time of the Conquest. I saw quite a large number of cases of leprosy in the St. Pablo hospital, which is set apart for the reception of acute and infectious diseases. There are a large number of cases, and one may see them in the city, wandering here and there. Residence in the hospital is not compulsory, and they can leave at their own volition. Referring to the point of enforced segregation, which I may take up briefly again, in connection with its bearing upon the extinction of the disease, there is no doubt that leprosy is slightly increasing. It was stated in an address by the president of the American Dermatological Association the other day, that within the last ten years the increase of leprosy in this country has been at least five fold, and there is no doubt that this statement is rather under than above the truth. I shall have occasion to speak of certain points bearing upon the contagion, heredity, and modes of propagation of leprosy, in connection with the exhibition of these lantern-slides, most of which were made from photographs taken in the Sandwich Islands. They have been selected from a large number of photographs illustrating the most characteristic clinical features of the disease, and by no means representing exceptional and exaggerated types of the disease. I have also so arranged them that we may observe the earlier manifestations of the disease, the macular spots, and afterwards the tubercular and mutilating forms of the lesions.

[About fifty lantern-slides, embracing two or three hundred figures, were then exhibited, showing every possible phase and manifestation of the disease.]

I had intended to make some remarks upon the contagiousness and hereditary character of leprosy, and upon the possible danger of the spread of leprosy in this country. I had also intended to make some allusion to the difficulty of the diagnosis of leprosy; but as I have taken up so much time I will not say anything more, except in regard to the question of diagnosis. To a physician seeing a typical case of leprosy, advanced in its evolution, the diagnosis presents no difficulty whatever. But in the earlier stages of the disease, and in anomalous cases, where the manifestations are by no means typical or characteristic in their mode of evolution, there are numerous possibilities of mistake. In fact, there is no disease, not even syphilis, so varying in its manifestations as leprosy; and in many cases it is impossible to arrive at a diagnosis unless the patient is kept under observation for a long time, and the evolution of the disease carefully observed.

The PRESIDENT.—Discussion on these papers will now be in order.

Dr. MAXWELL, of Florida.—Ladies and gentlemen, it was my hope that I should be prepared to read a paper on the subject of yellow-fever at this meeting of the Association—a subject that has occupied my attention for the last twenty-six years; but my attention was not called to the fact of the meeting at this time until too late for me to make the preparations necessary. The first direct intimation I had of the meeting at this time was the announcement, which excluded the possibility, as I thought, of taking up anything I might write. I wanted to say what is very generally accepted in the first place, that yellow-fever is a specific disease, not related to any other disease—is as distinct as small-pox or measles, or any other specific disease. And I wanted to say that, in my judgment, the treatment which I have seen generally is not only not remedial, but harmful in the fact that too much medicine is given. Yellow-fever is a disease of itself, of limited duration, while small-pox, measles, and typhoid fever will pass through their several stages unaffected by any so called remedial treatment. I was so impressed with that fact thirty-six years ago, when I received my first introduction to the disease, that when I myself was taken I did not take a dose of medicine.

The PRESIDENT.—The Chair must remind Dr. Maxwell that this is not a discussion of yellow-fever. He understands that he must keep to the discussion on the paper.

Dr. MAXWELL.—I will say in regard to Dr. Lee's paper, the resolution which contained the gist of the paper——

The PRESIDENT.—The Chair is sorry to interrupt Dr. Maxwell, but the resolutions are not before the meeting. They are referred to the Executive Committee, and when reported by the committee will come up for discussion to-morrow.

Dr. MAXWELL.—Then I shall try to confine myself to the subject of this paper. I am sorry that I am confined to any limit, because yellow-fever is one of the most important diseases before the public. The idea of the paper is, as I understand it, that the United States government should purchase Cuba for the purpose of protecting itself against the introduction of diseases which now exist in Cuba. Small-pox is already here. Leprosy is already in existence, in a few if not in numerous places. Yellow-fever is also common in a portion of the Union. There is never a month in the year when yellow-fever is not in existence in Key West. I state that fact from my own knowledge. When I resided there, as surgeon of the Marine hospital, this was also the opinion of Dr. Murray, of the Marine Hospital Service. I state it also upon the authority of Dr. Guiteras, in his elaborate paper published in the reports of the Marine Hospital Service. Dr. Guiteras confirms my own experience, my own knowledge, that yellow-fever is a disease, and the only fever that is never out of Key West. Malarial fever is never there, except when brought from the main land, or from Cuba, when it is brought there for the purpose of recovering. This year the existence of yellow-fever in Key West has been recognized, and quarantine has been there enforced. Yellow-fever has appeared there in several cases very recently, and the health officer of the city, whose home is at Key West, and who was there when I left the state, reported but a day before I did leave, that he had knowledge of the existence of the disease more than a month before these cases were reported. Nor is it wonderful, for the fact exists, and has not been changed since my whole residence there, that the circumstances under which yellow-fever appears in Havana are present always in Key West. The very conditions which were described so graphically by Dr. Lee as existing in Havana exist in Key West. Last spring the editor of the *Equator Democrat* said that the so called restaurants of Key West were a disgrace to civilization, and that if a hog were confined in one of them for twenty-four hours he would be likely to take the cholera.

Dr. HIBBERD.—I respectfully ask that the gentleman be confined to the subject under discussion.

Dr. MAXWELL.—I want to say that the object of the paper seems to me to be to propose a method for the prevention of a disease which exists, and I was trying to show that the reason for the existence of the disease in Havana also exists in Key West. I should be very sorry for the fact to go abroad that the American Public Health Association will not permit to be discussed, even for a few moments, this disease which is now taking so much attention, and for the suppression of which so much money has been expended. I had hoped to be able to express a few sentiments upon this subject in regard to the disease and its past history, about which I have informed myself very thoroughly; but of course I will not intrude.

The PRESIDENT.—The Chair has no option in this matter whatever. The discussion upon the paper is entirely upon those papers set forth.

Dr. MAXWELL.—May I ask if the discussion of the conditions which give rise to yellow-fever is not germane?

The PRESIDENT.—The Chair rules that the cases of yellow-fever at Key West are not germane; and the discussion is not in order.

Are there any other members who wish to speak on Dr. Lee's paper? There being no evidence of a further desire to speak, the president said,—" We will now proceed to the paper on ' Railway Sanitation,' by Samuel W. Latta, M. D., medical examiner for the Pennsylvania Railroad." (See page 145).

Dr. G. P. CONN.—Dr. Latta not being present, the paper has been referred to me to read. On looking at it I find it requires illustrations. No slides have been prepared with which to illustrate it by stereopticon. I therefore move that it be read by title, and referred to the Committee on Publication.

This motion was duly seconded and carried.

The PRESIDENT.—The meeting of the Executive Committee is called to take place immediately after the adjournment of this session at the Pierrepont House.

On motion duly seconded, the Convention adjourned until 9 A. M., to-morrow (Friday), October 25.

FOURTH DAY.

FRIDAY, October 25, 1889.

MORNING SESSION.—9 O'CLOCK.

President Johnson in the chair.

The PRESIDENT.—The Association will please come to order. The first business is announcements from the chairman of the Local Committee. Dr. Raymond says there are no announcements to make this morning.

The next business is announcements and reports of the Executive Committee.

The report of the Auditing Committee was presented and adopted.

The SECRETARY.—Mr. President, the Executive Committee have considered the resolution offered yesterday by Dr. Gihon, and recommend the following as a substitute:

Resolved, That a special committee of five on the Disposal of Garbage and Refuse be appointed, with instructions to make an exhaustive inquiry into that subject and report at the next meeting of the Association.

The PRESIDENT.—What is your pleasure, gentlemen, in reference to the report of the Executive Committee upon the resolution? Shall it be adopted?

On motion duly seconded, the resolution was adopted.

The SECRETARY.—Mr. President, the Executive Committee have considered the resolution offered by Dr. Rauch, relating to Asiatic cholera, and recommend its adoption. (For resolution, see page 288).

On motion duly seconded, this resolution was adopted.

The SECRETARY.—Mr. President, the resolution offered by Dr. Bell, relating to a committee to confer with the World's Fair Committee, has been considered; and the Executive Committee recommend that it is inexpedient to adopt this resolution. (For resolution, see page 298.)

On motion duly seconded, the recommendation of the Executive Committee was adopted.

The SECRETARY.—Mr. President, the Executive Committee recommend the adoption of the resolution offered by Dr. Raymond, relating to the duties of the Secretary. (For resolution, see page 271.)

On motion duly seconded, the resolution was adopted.

The SECRETARY.—Mr. President, the Executive Committee have considered the resolution offered by Dr. Wilkinson, yesterday, and regard it as inexpedient, and therefore recommend that the resolution be not adopted.

On motion duly seconded, the report of the Executive Committee was adopted.

The SECRETARY.—Mr. President, upon the resolution offered by Dr. Ashmun on the subject of Diphtheria, the Executive Committee make the following recommendation:

That a special committee of five be appointed to consider and report upon the subject. (For resolution, see page 255.)

On motion duly seconded, the report of the committee was adopted.

Dr. GIHON.—May I explain that the object in appointing a sub-committee was that this sub-committee should make an exhaustive investigation of the subject, and at the next meeting make a complete report as to the present status of the subject, as medical men understand it.

The SECRETARY.—Mr. President, the Executive Committee recommend the adoption of the resolution offered by Dr. Gihon relative to the destruction of the sputa of tuberculous patients. (For resolution, see page 253.)

On motion duly seconded, the report of the committee was adopted.

The SECRETARY.—Mr. President, the Executive Committee recommend that the resolution offered by Mr. French, relating to vital statistics, be referred to the "Committee on Forms of Statistics." (For resolution, see page 255.)

On motion duly seconded, the report of the committee was received and adopted.

The SECRETARY.—Mr. President, the Executive Committee recommend that the resolution of Dr. Lee for the annexation of Cuba be considered inexpedient of adoption, in view of its recommendation being beyond the scope and general object of this Association.

On motion duly seconded, the report of the Executive Committee was adopted. (For resolution, see page 289.)

Dr. G. C. ASHMUN.—Mr. President, I should like to suggest that the resolution be divided. There are some of those recommendations in regard to quarantine against leprosy which, I have no doubt, we would be glad to vote upon. The annexation of Cuba is entirely a different matter, and the committee find it inexpedient to act upon it. It seems to me there is a point there in regard to quarantine matters which would be desirable for the Association to act upon.

The PRESIDENT.—What is your pleasure, gentlemen, in regard to it? It can be referred back to the committee, and be considered and come up as future business.

Dr. BRYCE.—I should think, had it been possible to divide the resolution into two resolutions, the committee would have done so when they considered it. I imagine we shall have to accept the recommendation of the committee under the circumstances.

Dr. HIBBERD.—Mr. President, does not the service of the boards of health alluded to there include this ugly disease, leprosy, as among contagious diseases? They are confined to no particular line of action, but are to prevent the eruption, in this country, of this and every contagious disease.

Dr. PLUNKETT.—Mr. President, I move a recommittal of the resolution, that the committee may deal with it as they desire. If they see fit to report two resolutions, I think that would be very proper. It just emphasizes the importance of that special work, and the paper indicates the danger to which we are exposed.

The PRESIDENT.—A motion on the adoption of the report of the committee is before the house, and the question was about referring it back or dividing it. It can be referred back to the committee, or you can divide it yourselves. It is before you to do with as you please.

Dr. STANTON.—I move as a substitute the rejection of the first resolution offered by Dr. Lee, and the adoption of the second resolution, striking out the word "meanwhile."

This motion was duly seconded and carried.

The SECRETARY.—Mr. President, the Executive Committee have appointed, as a committee to consider the matter of exhibits, Drs. Walcott, Durgin, and Bryce, with full power to act thereon.

The PRESIDENT.—Let it be understood, this is not a committee of award, but a committee to consider and arrange for such action as in their judgment will be best. I make this explanation so that it may be understood that this is not a committee to give an award, but to consider and report upon the subject. What is your pleasure, gentlemen? Shall these gentlemen act as a committee of the Association—a sub-committee of the Executive Committee—or will the Association take any action upon it, or leave it entirely in the hands of the Executive Committee?

The Health Exhibit here has been collected by the Chairman of the Special Local Committee at this place, and it has been proposed that the Association, at the close of the exhibition, shall in some way express its appreciation of what has been done in this matter, in such a way as may be most fitting. This special committee of the Executive Committee was appointed to take that whole matter under consideration.

This motion was duly seconded and carried, and the committee was declared to be a general committee of the Association.

Several persons were then elected to membership.

Dr. GIHON.—Mr. President, there are a number of names which have come in too late for the action of the Executive Committee. They are gentlemen of influence in the Association, and desire to become members; and, as it is impossible for the proper recommendations to be presented with their names here in time for us to act without detaining the Association, I offer this resolution:

Resolved, That such persons whose names may be transmitted to the Executive Committee by the Local Committee, properly recommended, and filed within the next thirty days, shall be elected to active or associate membership.

If any of them are endorsed by the Local Committee, it gives the Executive Committee power within thirty days to put them on the list of active or associate members.

This motion was duly seconded and carried, and the resolution declared adopted.

The Presdent.—The report of the Advisory Council is next in order.

Dr. Rohé, Secretary of the Advisory Council.—Mr. President, I have the following report to present to the Association by authority of the Advisory Council.

[Dr. Rohé then read the report, for which see "Reports of Committee."]

The President.—You have heard the report of the Advisory Council, gentlemen. Will you take up the question of the resolutions as they were presented? The first is a resolution of Dr. Bryce, and which is recommended for adoption. What is your pleasure in regard to it?

On motion duly seconded, this resolution was adopted.

The President.—The next is a resolution by Dr. McCormack, reported back with a recommendation that it be adopted. What is your pleasure?

Dr. Wyman.—Is that the resolution inviting the coöperation of Mexico and Cuba?

The President.—Yes.

Dr. Wyman.—In view of the prevalence of yellow-fever on the Isthmus, and our close commercial relations with ports of that part of the world, I recommend that the Central American States be included in that resolution. I make that as a motion.

The question was put upon the amendment, and it was duly seconded and carried.

The President.—The resolution, gentlemen, is, as amended, now before you.

On motion duly seconded, the amended resolution was adopted.

[At a subsequent meeting of the Executive Committee, it was voted to insert after the word "Cuba" the words "and the United States of Colombia," so that the resolution as finally adopted reads as follows:

Resolved, in view of the rapidly increasing travel and commercial intercourse through this country and Mexico, Cuba, and the United States of Colombia, and the consequent growing importance of the establishing and cultivating the most friendly relations between the health authorities of our own and those of the countries above named, that a cordial invitation be extended to the sanitary authorities of Mexico, Cuba, and the United States of Colombia, to send representatives to the future meetings of this Association, and that the Secretary be instructed to open correspondence with these authorities, looking to this end.]

The President.—The next business is the election of officers of the Association for the ensuing year. Their election can be accomplished by the adoption simply of the report of the Advisory Council without balloting for them, if it is your pleasure.

On motion duly seconded, the report was adopted.

Dr. Rohé.—Mr. President, in order that it may be done in proper form, I move that the Secretary cast the ballot of the Association for the officers recommended by the Advisory Council.

The President.—You have heard the motion that the Secretary be instructed to cast the ballot of the Association for the nominations made in the report of the Advisory Council.

This motion was duly seconded and carried, and the Secretary cast the ballot; and the President declared the officers elected.

Dr. Rohé.—The recommendation as to the place of meeting has not yet been endorsed.

On motion duly seconded, Charleston was declared the place of meeting for next year.

The President.—Charleston, S. C., is declared to be the choice of the Association for its next annual meeting. The time of that meeting will be fixed by the Executive Committee. It has been suggested that the time of meeting shall be so late that it will not require the health officers of the more Southern ports to leave their field of work until the summer weather has passed—some time in November.

The next order of business will be the appointment of the new Advisory Council. That will be done with the appointment of other committees, and there are one or two not decided upon yet. There were some committees appointed last year which have made no reports.

Dr. Gihon.—Would it not be well for us to call these committees all in order, and if any reports have been received, discharge the committee, or, if not, continue them, with instructions to report at the next meeting.

The President.—That is what I was about to do. Is there any report from the Committee on State Boards of Health? Is there any report from that committee, Dr. Lachappelle, chairman? Do the members of the committee know of any report from that committee?

Dr. Walcott.—Mr. President, I believe my name appears on that committee. I have received no notice of any meeting. It answers no useful purpose, and I move the committee be discontinued.

This motion was duly seconded and carried.

The Committee on the Pollution of Water-Supply, Dr. Smart, chairman.—There is no report from that committee. What is your pleasure in regard to it, gentlemen?

Dr. Gihon.—I move it be continued, and requested to report finally at the next meeting.

Dr. Hibberd.—I think that we had better not continue any committee that does not report. I suggest a new committee.

Dr. Rohé.—The committee made a very exhaustive report, and probably considered their report final, at the last meeting in Milwaukee.

The President.—You have heard the motion, gentlemen, which I believe, as it now stands, is, that the committee be continued and requested to report finally at the last meeting.

This motion was duly seconded and carried.

The President.—It has been requested that Dr. F. P. Vandenberg, Professor of Chemistry at Buffalo, be added to that committee. Is there any objection to the addition? I do not know that the number was absolutely designated. If there is no objection, I will add that name to the committee.

On motion, duly seconded, the name was added.

The PRESIDENT.—The action of the Association this morning, gentlemen, has been to change the title of that Committee "On the Disposal of Garbage" to the Committee "On the Disposal of Garbage and Refuse," and to limit the number to five. Is there any report from the committee? The members of that committee will be Dr. Kilvington, Dr. Louis Laberge, Dr. Granville P. Conn, Prof. Delos Fall, and Crosby Grey.

The Committee on Animal Diseases and Animal Food: Is there any formal report from that committee? We have had papers on the subject. What is your pleasure in regard to that committee? Dr. Salmon is chairman.

Dr. PLUNKETT.—I move that the committee be continued.

This motion was seconded.

Dr. GIHON.—I would like to add, "with instructions to report finally at the next meeting of the Association."

On motion, duly seconded, the committee was continued, and instructed to report finally at the next meeting of the Association.

The PRESIDENT.—Committee on Forms of Vital Statistics: Is there any report from that committee?

The SECRETARY.—I would say, Mr. President, the chairman of that committee informed me that a report is in preparation, and he expected to be at this meeting. He telegraphed me yesterday that he was unable to get here. It is evident the committee is doing some work, and I move that it be continued.

Dr. PLUNKETT.—Mr. President, I move to amend the Secretary's motion by suggesting that possibly they could have the report ready after a little time, and hand it to the Secretary for publication in the proceedings of this meeting. If it has been partially completed, it would take but little time to finish it. I move, therefore, that they be allowed that privilege.

The SECRETARY.—It seems to me that would be something out of the usual course, because the report would not receive the sanction of the Association. Certainly, it would throw the responsibility entirely upon the Publication Committee, and it seems to me that it would be better to let it remain until our next meeting.

Dr. PLUNKETT.—I do not think it is a matter requiring a great amount of discrimination. I think that committee is entirely competent to decide upon it, and report upon it at the next meeting.

Dr. GIHON.—It is establishing a precedent. It may be all right in this instance, and all wrong in others. I therefore move that Dr. Plunkett's resolution be laid upon the table.

This motion was duly seconded and carried.

The PRESIDENT.—What will you do with the motion of Dr. Watson to continue the committee?

The motion was duly seconded and carried.

The PRESIDENT.—The committee is continued. The chairman is the President of the Association. It will not necessarily take him off the committee. I do not know whether he will desire to be replaced.

It was moved that the committee be continued in its present form.

Dr. ROHÉ.—Mr. President, that is a little irregular. The President has absolute authority to appoint special committees. The authority is given him by the Association, and a vote of the Association, such as this, would take out of the hands of the President that power. He is responsible for the appointment of the committee, and ought not to be limited at all.

The PRESIDENT.—I understand that it is a matter in which, as I said, if there was no objection, I should not take the responsibility of changing the name of the chairman.

The Committee on Incorporation is a committee that has nothing to do, but is a part of the machinery of our organic law, and must be continued. The President is *ex officio* the chairman of that committee. I will therefore report Dr. Baker's name, instead of my own, upon it, and the committee is continued.

The Committee on Protective Inoculation in Infectious Diseases: Dr. Sternberg has given us a paper.

Dr. WALCOTT.—I am requested to say that his time has been so occupied in the last year that he is not able to undertake any active work in connection with the committee; that there was no positive report which it would seem possible to make. Therefore, if it seems desirable to this body, it would be well that the committee be continued.

Prof. W. H. BREWER.—Mr. President, Dr. Sternberg recommended getting a bibliography of the subject, and it is now in progress. I second the motion to coutinue the committee.

Dr. GIHON.—I offer an amendment that the number of the committee be increased to five. The President has power to add an additional member. After consultation with Dr. Sternberg, I think it will require another name.

On motion, duly seconded and carried, the committee was continued, and its number increased to five.

The PRESIDENT.—The committee is continued, and I will request Dr. Gihon to communicate with Dr. Sternberg as to the appointment of the additional member.

Committee on Resolutions in Relation to Commissioners of Health.

Dr. WALCOTT.—Mr. President, I regret to say that this committee has not been able to report. Certain facts have been brought together, and certain materials are in the possession of the chairman of the committee, but it has not been possible to get the committee together for a final consideration of the matter. I have been out of the country myself for a number of months, and I ask for further time as a favor from the Association.

On motion, duly seconded and carried, it was voted that further time be allowed this committee.

The PRESIDENT.—The time of the committee is continued, and I would take the liberty of changing one name upon it. In place of Surgeon-General Browne, I beg to appoint Dr. Albert L. Gihon. I do this after some consultation, and hope it will be acceptable.

The Committee on Sanitary and Medical Service on Emigrant Ships.

Dr. DURGIN.—The committee has not made a report this year. A committee on the same subject made a report last year. That report was not seen by myself until late this season. I think that is the case with the other members of the committee. At all events, when I did see the report I was in some doubt as to what was meant by an expression contained in it. I endeavored to get materials together for a report at this session. On consultation with the other members of the committee it seemed best that a report should not be hastily got together and presented at this session. The time given this committee was not sufficient, and it remains for the Association to say whether it shall continue the committee and give them time to make the investigation, or leave the question wholly in the hands of the Association. If the committee should be continued, a report will undoubtedly be made another year.

On motion duly made, seconded, and carried, the committee was continued.

The PRESIDENT.—I do not see any objections to increasing that committee.

Dr. DURGIN.—Let the committee be increased to five.

On motion duly seconded, the committee was increased from three to five members.

The PRESIDENT.—I will appoint upon the committee, in addition, Dr. Wyman of the Marine Hospital Service, and Dr. Wilkinson, of New Orleans.

The new Committee of Arrangements will be selected, excepting the chairman, by the chairman of that committee. I will appoint Dr. H. B. Horlbeck, of Charleston, S. C., as the chairman of the Local Committee of Arrangements, with power to appoint the other members of the committee.

The President then appointed the Advisory Council for the ensuing year. (See "Officers and Committees.")

The PRESIDENT.—The members of the Publication Committee are, the Secretary, Dr. Alfred F. Holt, and Dr. G. P. Conn.

That completes the appointments of the committees, excepting the new Committee on Diphtheria. I have not yet considered that. If you will allow me a little time, before the close of the session I will announce that committee.

The next order of business is miscellaneous or unfinished business; I do not know of any.

Dr. GIHON.—Mr. President, I have a resolution that will have to be offered some time in the day; and although it is not properly in the proceedings now, in view of the fact that some of the members may leave the room I propose offering it at this time:

Resolved, That the thanks of the American Public Health Association be tendered to the mayor, the common council, police commissioners, fire commissioners, and all the municipal authorities of the city of Brooklyn, to the citizens of the city and the local Committee of Arrangements, to Dr. Wm. M. Smith, health officer of the Port of New

York, to the board of directors and secretaries of the Brooklyn Institute, to the trustees of St. Mary's hospital, to the trustees of the Hoagland laboratory, to the regents of the Long Island College hospital, to the president of the board of education, to the press of Brooklyn and of New York and to the Associated Press, to the Brooklyn Street Railway, Brooklyn City & Newtown Railroad Company, the Coney Island & Brooklyn Railroad, and the Atlantic Avenue Railroad, to the Brooklyn & Union Elevated Railroad, King's County Elevated Railroad, and the Brooklyn & Brighton Beach Railroad, to the Hamilton Club, the Brooklyn Club, the Long Island Historical Society, to the Brooklyn library, to Mr. Charles Pratt of the Pratt Institute, Mr. C. C. Martin, chief engineer and superintendent of the Brooklyn bridge, Charles A. Shepard and A. L. Wood of the N. Y. and N. J. Telephone Company, American District Telegraph Company, and to all other persons and corporations who have extended courtesies and privileges to the Association.

This motion was seconded by Dr. Brewer.

Dr. PLUNKETT.—Mr. President, I want to amend that resolution and include the Local Committee of Arrangements and its chairman, Dr. Raymond.

Dr. RAYMOND.—I would simply say that the work done has not been done by any single individual.

Dr. GIHON.—As a member of the local committee I am here in a double capacity. I desire to say on behalf of that committee, that they will be delighted to have that expression included in the resolution. In regard to Dr. Raymond, every member of the committee recognizes more than this Association can their obligations to him. [Applause.]

The PRESIDENT.—Dr. Gihon is present at this time not as a member of the local committee. He may meet with the local committee elsewhere. It gives me pleasure, therefore, gentlemen, to ask you to vote upon this resolution as amended.

The resolution as amended was duly seconded, and carried unanimously.

The PRESIDENT.—I am sure this is only a fuller expression of the appreciation which we all feel for the generous hospitality and the excellent arrangements for the transaction of business, and for the very full reports of the papers which have been read here, and for everything that has been done here for the accommodation and to advance the usefulness of the Association.

Dr. JEROME WALKER.—I have just received a communication from the superintendent of the Brooklyn Society for the Prevention of Cruelty to Children, sending an invitation through me to the members of the Association to call at the office of the society, 141 Montague street, any time between 8 A. M. and 6 P. M. I happen to know that several of the gentlemen of this Association are deeply interested in this subject of the prevention of cruelty to children. In some of its aspects it has come before the Association in its work; and as there has been an attempt made in several of the states to start new societies, it seems very proper that it should come before the Association.

Dr. ROHÉ.—I move that the invitation of the Society for the Prevention of Cruelty to Children be accepted, with thanks of the Association.

Dr. Gihon.—I ask permission to add the name of the president of the society to this list given in the resolution just adopted.

Dr. Wyman.—I should like to take advantage of this opportunity to speak of the *Weekly Abstract of Sanitary Reports* published by the Marine Hospital Bureau, as I am in charge of the work. I should like to state that it would please us very much if all health officers from different sections of this country and other countries would send to us what might seem to be valuable or worthy of publication in the interest of sanitation and sanitarians. It is also my desire and the desire of the surgeon-general to extend the circulation of the "Abstract," and if there are any gentlemen here interested in sanitary matters who do not receive a copy, I should be very glad to have their names.

The President.—We will now proceed to the reading of papers. The first paper is on "Necessity of More Rigorous Inspection of Meat-Producing Animals at the Time of Slaughtering," by D. E. Salmon, D. V. M. There is a paper before that on "Compulsory Vaccination," which I overlooked, but Dr. Smith is not here, and the Association will listen to Dr. Salmon's paper. (See page 173.)

Dr. Clough.—Mr. President, just now I received telegrams from the governor of Colorado and the mayor of Denver, extending a most hearty and cordial welcome to hold the meeting of 1890 or 1891 in Denver. I mention this fact because I had advised the Advisory Council that I was expecting these telegrams.

The Secretary read a communication from Gov. Rice, of Texas, extending an invitation to the Association to hold its next meeting in that state.

The President.—It will be in order to receive them and place them on file. Unfortunately, we can meet in but one place in one year.

Dr. Hibberd.—Mr. President, I would suggest that the thanks of the Association be extended to the executives of these states.

This motion was duly seconded and carried.

The President.—The next paper is on the "Causes of Infant Mortality," by Dr. R. O. Beard, assistant commissioner of health of Minneapolis, Minn., and Professor of Physiology in the Medical Department of the Minnesota State University.

Dr. Beard was not present, and his paper was read by Dr. Gihon. (See page 82.)

Dr. Walker.—Mr. Chairman, I want to call attention to the fact that three papers have been read on this subject, and each has taken up the subject in a different way, but all have agreed upon one or two things. It is a curious fact that all have agreed that in this country infant mortality is not discussed to any great extent. Every paper has practically agreed that the way to decrease mortality is to increase the knowledge of the people at large on sanitary matters, and especially those persons having charge of children, and, of course, added to this, the generally increased improvements in administration of health matters, which every paper endorses. It does seem to me that we have come to a time in sanitary science—hygiene is not a science practically—when a few carefully selected men in various states of the Union, taking ample time to consider this question of infant mortality,—two or three years communication with one another,—could bring out a series of suggestions, regulations, rules, and experiences which would be valuable in discussing the rate of mortality in the next five years. This is merely a suggestion which has occurred to me. One other thing: I doubt whether it will be possible, unless the method of keeping statistics be improved, to find by statistics in health offices anything satisfactory in regard to infant mortality. It has been my experience in looking up the statistics, and everybody who has had experience with children knows, that lots of cases reported as marasmus are not marasmus, and cases reported as pleurisy are not pleurisy. I believe that statistics, therefore, at present are of no value.

Dr. RAYMOND.—Mr. President, is it proper at this time to move the appointment of such a committee?

The PRESIDENT.—A motion can be offered to that effect.

Dr. RAYMOND.—I make the motion.

Dr. PLAYTER.—Mr. President, if I could make a suggestion in reference to this paper, I would strongly urge such a committee. I think it would have a very desirable effect, if, as the gentleman who has just sat down remarked, the work could be continued over a long time.

The PRESIDENT.—The motion to appoint a committee on the mortality of infants would, in the natural order of things, of course go to the Executive Committee. It involves really the introduction of new business. I do not know whether the Association would be compelled to make that disposition of it. To refer it to the Executive Committee or Advisory Council would prevent it from being acted upon at this meeting.

The SECRETARY.—If Dr. Raymond will withdraw his motion, I have another resolution which perhaps would solve the difficulty. It is a resolution which has just been offered by Dr. Kilvington:

> *Resolved*, That the Association establish a section to consider and report to the Association upon matters relating to preventive construction in hygienic work.
>
> *Resolved*, That a committee of five be appointed to consider and report upon the above mentioned subject.

As this resolution cannot be discussed, I move that it be referred to the Executive Committee, with power to authorize such committee if deemed advisable, and that, if authorized, the president shall appoint and furnish the secretary with the names and addresses of such committee, which shall be printed together with the other committees.

Dr. RAYMOND.—It seems to me that committee hardly covers exactly the work I have in view. That refers to a committee on hygienic work, which is somewhat broader than my motion intended. I move a committee be appointed to report at the next meeting on the subject of Infant Mortality,—a committee of which Dr. Walker shall be chairman,

—the other members shall be appointed by the president after consultation; and that this motion be referred to the Executive Committee, with power to act.

The PRESIDENT.—You have heard the motion, gentlemen. It goes to the committee without discussion; and if the Executive Committee decide to act upon it, the committee will be appointed subsequently.

The discussion will now be in order.

Dr. ASHMUN.—Mr. President, I rise to say just one word. Of all the elements of a community needing instruction upon this particular matter, I know of none more needy than the medical profession. We have brought out in this paper just read, and in the other papers read on a similar topic, covering each a particular field, the fact that in our reports of diseases and modes of death there is a constant confusion among medical men, so that it is well-nigh impossible to ascertain correctly the statistics on this subject of infant mortality. I have under my own observation a professor in a medical college teaching in the chair of Diseases of Infants and Children, who also is at the head of a Maternity House Lying-in Institution, who insists that all the deaths in that institution, arising, as he knows and as I know, chiefly from the pernicious hygienic situation there,—I say, he insists upon classifying all those deaths as being from marasmus, making no distinction whatever as regards inanition, or infantile debility, or any other causes, which simply means a failure to sustain life. Until we can secure better instruction in our medical schools, young men there will continue to go out with this same misapprehension in regard to the situation and to these facts. In the institution to which I refer (after an existence of eighteen years), last year they buried the only child which they have ever raised to the age of six years. Now, I say while such things continue, and while such misapprehensions and such misinformation in regard to this matter continues, the medical profession above all others, above all other elements in the community, need instruction on this point. If this committee is appointed as contemplated, I hope it will embrace men who can speak with some authority and with a great amount of knowledge, and can present the subject, covering all the information now attainable on the matter.

Dr. HIBBERD.—Mr. President, I think I voice the sentiment of this Association when I declare that I have had an immense pleasure in this elegantly written and superbly read paper; but there is one point not touched upon by the papers to which I wish to call attention. I am sorry the writer of this paper did not touch upon this point. He took no notice of the diet of a child for the first twenty-four hours of its existence. I think you will upon a moment's reflection recognize that in the multiplicity of ways in which a child is cared for, particularly for the first twenty-four hours, is laid the foundation for its good or bad health for two, three, or five years, and probably for life; and if we need instruction in regard to the general affairs of infant disease and the foundation of infant mortality, we need especially emphatic knowledge in regard to this matter of taking care of children for the first twenty-four hours after they are born.

Dr. E. H. Janes, of New York.—Mr. President, I wish to call attention to one or two facts illustrating the influence which a wise system of state or municipal sanitation may exert in saving the lives of young children. The two papers on the subject of infant mortality to which I have listened, attach a good deal of importance to the duties of health authorities in so administering sanitary laws as to prevent, or control as far as possible, the various causes which act injuriously upon infant life. I do not know of any better illustration of what may be done by health authorities toward reducing the rate of infant mortality than is afforded by the records of the health department of the city of New York. During the year 1867, which was in the early days of the present system of health government, the percentage of infant mortality to the total number of deaths was 52.98; or, in other words, of all the deaths occurring in the city during that year, more than one half, or about 53 per cent., were of children under five years of age. In no year since that time has the rate of infant mortality been so high; but, on the contrary, it has gradually decreased year by year to the present time, with an occasional exception, which I will mention. In 1871 the percentage had been reduced to 48 with a small decimal. In the following year we had an excessively hot summer, and during the months of July and August a large number of children died, bringing the percentage for 1872 up to 49.58. After this it gradually went down, with one slight exception, until 1880, when for three following years there was a slight rise, due in great part, if not entirely, to the unusual prevalence of scarlatina and diphtheria; but in no one of these years was the percentage above 46.2. In 1883 it was down to 40.74, which was considerably below that of any previous year; but that year was a remarkably healthy one, there being no excessively hot weather, which is always severe on young children. During the following year the percentage was 43.39, from which it has been gradually reduced to the present time, and there is every indication that for this year it will be down to 42 or below. Here we have a steady reduction in the percentage of infant mortality keeping pace with sanitary work for a period of more than twenty years, with but occasional slight variations due to climatic causes, or to the unusual prevalence of those diseases which are especially fatal to young children. If this means anything, it means that faithful and persistent effort toward the improvement of sanitary conditions will have the effect to reduce the rate of infant mortality, that a larger number of children will live through the most susceptible period to that age when the future expectation of life is the greatest, and that consequently the average duration of human life is increased. It also means that there is not only a saving of life, but, as for every death it is estimated that there are about twenty-eight cases of sickness, a large amount of sickness and suffering is prevented. Furthermore, it has been shown that this gain is among the very classes that have most needed attention, as it has followed step by step improvements made in the homes of the poor, so that to-day, notwithstanding the sad pictures of tenement-house life which still remain, our statistics show that the death-rate in tenement houses is below the total death-rate in the city at large. There can be no doubt that this is the result of improved sanitation, and especially such sanitation as improves the condition of tenement houses by affording more light, better ventilation, enlarged breathing space, and improved systems of plumbing and drainage. In addition to all this, tenement-house mothers receive full instructions every summer from the medical corps on the importance of cleanliness, dress, and feeding of children, and open air exercise.

Dr. W. M. SMITH, of New York.—Mr. President, referring to the question of statistics and infant mortality, it appears to me that sanitarians must depend upon the organization of intelligent boards of health throughout our country. They are the depositories to which the sanitarian must go. Secondly, those boards of health must not accept the report of the ignorant practitioner. When the practitioner reports to the board of health as a cause of infant mortality "debility," it should be promptly sent back to correct the diagnosis. When he reports "marasmus,"—and there is a growing tendency now to report cases of mortality as of heart failure,—it means nothing more than that it is a symptom; there is a cause behind it. Let the local board of health correct or have the diagnosis corrected. It is but a cover for the ignorance of the practitioner, in my opinion. I see much of this on board incoming vessels. When I see an infant reported as dying of debility or of marasmus, I know it simply means that the surgeon did not know what it did die of. I believe by these means we shall attain through the local boards of health a more satisfactory report of statistics.

Dr. FRANKLIN GAUNTT.—Mr. President, the time is certainly very significant in regard to the cause of infant mortality. It seems to me that it can be reduced to a very small period. It is simply, as we understand it, infant mortality within two years of age. They die from want of nutrition, want of proper food in a majority of cases; instead of being nursed by the mother, they are artificially fed. Changes take place in this climate very rapidly, so that what is introduced into the stomach of the child is often fermented by exposure to the air. This is one cause of infant mortality. If you have children with summer complaint (which is a good name), take them into a cellar with an atmosphere of 60°, and 90 per cent of them will get well.

Dr. ROHÉ.—Mr. President, the remark made seems to simplify the condition of the problem very much; but it strikes me the increased temperature is not alone the cause of infant mortality. Where food is undergoing decomposition, that certainly is a matter easily remedied. Nurses can very readily be instructed to sterilize the food; and it has been my own experience in a colored infant asylum under my supervision, that since the adoption of systematic sterilization of all the food the children received, the mortality has been greatly reduced. Deaths from cholera infantum, and cholera infantum so called,—because I believe there are other diseases called by that name,—have been reduced to a minimum. They have almost disappeared, while there are additional deaths from marasmus, as it appears so often in mortality tables. In other words, wasting diseases, such as tuberculosis, or constitutional syphilis and hereditary syphilis, are still brought forward; and as we cannot correct that very readily by the administration of food, and as the administration of medicine to these children is extremely difficult, we have almost the same proportion of deaths from these conditions. Those of you who have had any experience with foundling asylums know how very frequently the children brought from these asylums are infected with tuberculosis, etc. But the purely infantile bowel troubles have been almost obliterated in the asylums, and the only means to which I can ascribe it is the strict sterilization of the food. The asylum is in the same unsanitary condition that it was before. The children are crowded together in rooms of insufficient size. The temperature does not vary so much in some summers. It was a little lower last summer than it was the summer before, but still we had some pretty hot weather. I do not think I should like to put children in a cellar unless I had very good means for ventilating that cellar. If I did not have a good house, I should not think I had a good cellar under it.

A MEMBER.—Please tell us how you sterilize your food.

DR. ROHÉ.—I simply boil it, heat it to the boiling point or a little below, and keep it at that temperature. That is all that is necessary to sterilize it. I am going to make some experiments with prepared foods in the course of the next year. I am not prepared to say to the Association just at the present time what I can experiment with; but the experiments shall be conducted impartially, and with all the precautions necessary for the investigation. The trouble I apprehend Dr. Smith also has is the very indefinite and very vague diagnosis given in infantile diseases. Cholera infantum is a name which occurs very often in our mortality list, and yet the cases of true cholera infantum are exceedingly rare. I do not think many practitioners in cities see many cases of cholera infantum in a year, but they do see cases of inflammatory troubles of the intestinal canal. These cases ought to be named under entirely different names because they are different and the treatment is different. I may say that since our fellow-laborer, Dr. Vaughan, of Ann Arbor, has published his "Researches on Ptomaines," I adopted the view that true cholera infantum is the result of milk decomposition in the intestinal canal. As soon as I see a case I stop all milk and all food, and simply administer stimulants—whiskey and water. I do not want to take all the time in the discussion; but since the suggestion of Prof. Vaughan that there was an etiological relation between certain ptomaines and cholera infantum, it seems to me that the different results between so called cholera infantum and inflammatory chronic troubles of the intestinal canal of children are something that certainly demands more study than they have received from physicians and sanitarians generally. I think it is a subject that would be fruitful of results if taken up by this Association for proper study, and at some future time I will make a motion to that effect.

Dr. MacDonald.—Mr. President, there is a point which I think has been overlooked in the course of the discussion, as to the similarity between cholera infantum and other diseases of children similar to that between Asiatic cholera and dysentery. I contend, as I advance the idea, that one of the primary causes of cholera infantum is heat; but the beginning is a disturbed condition of the nerve centres. In gastritis, and that class of troubles that result in inanition and marasmus, the bacillus is at work. There are more deaths all over the United States to-day from cholera infantum of children under one year of age than all others put together. The foundation of the trouble is generally in the imperfect operations of the nervous system, when we have a temperature of 90 degrees and over, when the beginning of the trouble is a disturbed condition of the nervous centre produced by heat. Following that, if you prevent collapse, then you have disturbances of digestion which follow and ultimately produce death.

Dr. W. M. Smith.—I only wish to remark that I neglected to confirm what my friend Dr. Janes, of the board of health, said, that it is something of a surprise to know that the deaths in the tenement districts of New York city, as represented by one of the most careful statisticians who has ever supervised that department of public health, is less than in the other districts in New York, and I was much struck by the feature of the paper referring to the close atmosphere, the high temperature, the unventilated rooms of the luxurious homes, while in the tenement districts we pretty generally admit there is plenty of fresh air and plenty of circulation outside; it is something of a surprise to learn that the death-rate in those districts is less than in the favored districts of New York city.

Dr. Janes.—We must acknowledge this, that the children living in tenement houses live a great deal of their time out of doors. A great improvement has been made in tenement houses, and they have the addition of living out-doors, whereas those in better circumstances, the children of the rich, are kept in the house most of the time, or else in their little carriages are allowed to be rolled back and forth a short time during the day, while you see the tenement-house children out playing on the sidewalks or in the yards, breathing the out-door air; at least, they did that before 1867.

Dr. Ashmun.—Mr. President, in the city of Cleveland, among the Irish living in poor houses, and whose children spend their entire lives almost in the streets in the dirt, we have very little of the infantile diseases, I mean by this especially the intestinal disorders. But among the Bohemians, Poles, and sometimes the Germans, where they use little sacks of feathers for the children to lie upon and put over them all through the year, we have a terrible mortality.

Dr. Raymond.—Mr. President, it seems to me the discussion has taken a shape which shows the great importance of the form of study that this Association should give to the prevention of infant mortality. Whatever may be the experience of others, I am sure that the tenement houses of this city are very much less ventilated, have very much less air circulated through them, than the houses of the better classes, and the children who are sent to our seaside homes with bowel troubles, cholera infantum, and other diseases of that nature, are from the tenement-house district. It occurred to me, referring to Dr. Janes's statement about the children appearing on the sidewalk, that possibly one reason for that might be the cold atmosphere of the dwelling-rooms. Whatever may be true of other places, it certainly is the fact here that the children of tenement houses have bowel diseases.

The PRESIDENT.—The next business in order on our programme, gentlemen, is a paper on the "American Methods of Manufacturing Oleomargarine," by Edgar Richard, Microscopist U. S. Treasury Department, Washington, D. C.

The SECRETARY.—The two following papers on the programme would be somewhat tiresome to read, but they are valuable for record; so I would move that they simply be read by title and referred to the Committee on Publication. (See pages 101, 107.)

This motion was duly seconded and carried.

The PRESIDENT.—That completes the programme. I am sorry that Dr. Stephen Smith has not been here. There are some announcements to be made,—the appointment of the Committee on Diphtheria. I would appoint on that committee, Dr. G. C. Ashmun; Dr. F. H. Colton, of Brooklyn; Dr. A. W. Cantwell, of Iowa; Dr. P. H. Bryce, of Toronto, Ont.; and Dr. Wm. T. Councilman, of Baltimore.

Is there any other business, gentlemen?

Dr. SALMON.—I should like permission to present a short paper from the Committee on Animal Diseases. (See page 173.)

The PRESIDENT.—The paper is before you, gentlemen. It will be received and referred to the Publishing Committee without a vote, unless there is some objection.

There was no objection, and the paper was so referred.

This, I believe, closes the business that has been arranged for this meeting, according to the programme, and with it the performance of the duties that have devolved upon me as your president. I have no farewell speech to make, but I do wish to thank the gentlemen all for their very kind support which has been given to me, and for the interest manifested by the Association in its work. I join with the Association and wish also to express my personal appreciation, in extending thanks to the good people of Brooklyn, who have given us such generous hospitality; and I may say that the city of Charleston, which has always been noted for its generosity and hospitality, will have to make a strong effort, as I know they will under the stimulus of Dr. Horlbeck, to rival what has been done for us in Brooklyn.

Now, gentlemen, thanking you again, it gives me pleasure to introduce to you the first vice-president elect, Dr. Frederick Montizambert, who, in the absence of the president, will now take the chair. (Applause.)

Dr. MONTIZAMBERT.—I beg to be allowed, in taking the chair, to express to you gentlemen my most cordial acknowledgment of the high honor you have done me in electing me first vice-president for the ensuing year, and to express regret that our new president, Dr. Baker, is not present.

It was moved that the convention adjourn to meet in Charleston next year at such time as should be announced by the committee. Dr. Montizambert put the question upon this motion, and it was duly seconded and carried, and the convention, at 11:45 A. M., adjourned.

REPORTS OF COMMITTEES.

PRESENTED AT THE SEVENTEENTH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, BROOKLYN, N. Y., OCT. 22–25, 1889.

REPORT OF THE COMMITTEE ON ANIMAL DISEASES AND ANIMAL FOODS.

Your committee would respectfully report an improvement in the sanitary condition of the meat-producing animals of the United States. The contagious lung plague of cattle has been nearly eradicated through the efforts of the national government. This greatly improves the condition of the herds of cows around some of our largest cities, and removes the dangers which follow the consumption of milk and beef from cows so affected. Regulations have also been adopted during the year by the United States Department of Agriculture for preventing the infection of cattle with the Texas fever, contagion during transportation, by requiring disinfection of cars, and separate pens in stock-yards for susceptible cattle. These regulations have reduced the prevalence of the disease the present year, and when more strictly enforced, as they probably will be next year, it should be almost entirely prevented. The better understanding of the nature and modes of dissemination of the hog-cholera virus have also somewhat reduced the number of animals affected with this malady. The glanders of horses is very prevalent in many parts of the country, particularly in cities. Cases of transmission to man are annually reported, and it is desirable that boards of health should take more active measures for preventing the use of glandered horses on the public highways.

Tuberculosis, the most interesting and serious of all animal diseases from a public health stand-point, is practically uncontrolled. Your committee is pleased to learn, however, that more interest is manifested in this matter. Some boards of health are inaugurating inspection, and public opinion has been educated to a point where such inspection will probably be reasonably well supported. There are reasons to believe that an effort will be made in the coming session of congress to secure national inspection, and possibly measures of repression, for this disease. While your committee has been heretofore of the opinion that this work could be best managed by the local boards of health, it must be admitted that the magnitude of the work, the need of uniform measures all over the country, and the lack of sufficient funds by most of our boards, are strong reasons for a national service. Your committee conclude, therefore, that from whatever source the money and authority is derived, any systematic measures for the control or suppression of tuberculosis in cattle should be welcomed by the members of this Association, and should receive their cordial support.

Respectfully submitted,
D. E. Salmon,
Chairman of Committee.

REPORT OF THE ADVISORY COUNCIL.

To the American Public Health Association:

The Advisory Council was called to order at 10:20 A. M. by the President of the Association, Dr. Hosmer A. Johnson, and, upon motion of Dr. James A. Hibberd, Dr. George H. Rohé was elected Secretary.

Resolutions presented to the Association by Dr. P. H. Bryce, requesting coöperation between the governments of the United States and of the Dominion of Canada in taking the next census, were referred to a committee consisting of Drs. Bryce, Homan, and Allen, and reported back with some verbal modifications, and, on motion, the Council recommended the adoption of the resolution as modified. (For resolutions see page 247.)

Resolutions presented to the Association by Dr. J. N. McCormack, inviting the coöperation of Mexican and Cuban sanitarians, were referred to a committee consisting of Drs. Gihon, Wyman, and Salomon, and upon their report the Council recommend favorable action. (For resolutions see page 247.)

Invitations to the Association were received from official sources from Galveston, Texas, and Charleston, S. C., and unofficially from Kansas City, Denver, Minneapolis, and Montreal. After some discussion, Charleston was unanimously selected by the Advisory Council, and that city is recommended to the Association as a suitable place to hold its next annual meeting. The Council request the Executive Committee to fix the time of the meeting at a date not earlier than November 1, 1890.

The Council nominated the following as the officers of the Association for the ensuing year, and recommend their election:

President.—Dr. H. B. Baker, of Michigan.

First Vice-President.—Dr. Frederick Montizambert, of the Province of Quebec.

Second Vice-President.—Dr. J. H. Raymond, of New York.

Secretary.—Dr. Irving A. Watson, of New Hampshire.

Treasurer.—Dr. J. Berrien Lindsley, of Tennessee.

Executive Committee.—Dr. L. F. Salomon of Louisiana, Dr. William Bailey of Kentucky, Dr. H. B. Horlbeck of South Carolina.

The Council recommend that the thanks of the Association be returned to the authorities of the city of Galveston for their courteous invitation, with regrets that the invitation could not be accepted the present year.

George H. Rohé, *Secretary*.

Brooklyn, N. Y., Friday, October 25, 1889.

REPORT OF THE COMMITTEE ON NECROLOGY.

Edward G. Washburn was born at Williamsburg, Mass., June 15, 1819, and was the son of Amos Washburn, a farmer. Most of his boyhood was spent in that town, but he afterwards moved to Belchertown, where he lived in the same family with Herschel Fenton, a well known violinist. This gave the youth an opportunity to cultivate a natural taste for music, and he learned to play the violin under the instruction of young Fenton's father, a musician of local note. Mr. Washburn learned his trade as a planer in Amherst, and carried it on in Westfield. He was married September 18, 1844, to Miss Sylvia B. Cheney, of Orange. They remained in Westfield until 1849, when Mr. Washburn moved to Springfield, Mass., and entered the employ of W. L. Washburn, on Market street, doing ornamental wood carving. Later Mr. Washburn was engaged at the Wason car-works for a time, and then in the United States armory. He had many popular qualities as a young man, which his proficiency as a musician helped to enhance. Mr. Washburn entered the undertaking business October 1, 1865.

Mr. and Mrs. Washburn have had three sons—H. Murray, a paper manufacturer at Philadelphia, Carroll D. and Cheney D., of Springfield, Mass. Mr. Washburn was a man of sound sense and active mind, somewhat reserved with the world at large, but responsive and companionable with those whom he liked. He kept a close and intelligent watch over the progress of events, reasoned for himself, and came to independent conclusions. When the serious side of life oppressed him, he could enter into the relief which came with the flow of lighter thought. He had been a close student of the Bible, and during the latter years of his life allied himself with the Universalist denomination. Those who found the expense of burying their dead a burden received practical sympathy at his hands. Mr. Washburn was a member of Hampden Lodge of Masons, and was elected to membership in the American Public Health Association in 1888.

Dr. Samuel Preston Moore died somewhat suddenly at his home in Richmond, Va., May 31, 1889, at the age of seventy-four years. He was a remarkably well preserved man, but for some months he had noticed and remarked to his friends that his strength was failing as a result of advancing age, although such was scarcely noticeable by those who were in the habit of daily meeting him. He was a great sufferer from frequent attacks of trifacial neuralgia, from which he could obtain relief only by the use of chloroform, a vial of which he often carried in his pocket. But on May 30th, the day before his death, he was more than usually sprightly, and visited the office of the superintendent of public schools of Richmond (fully a mile from his home), and manifested great interest in the forthcoming high school commencement, in arranging for which he had devoted much time and effort. He returned home, and partook of dinner with his usual relish about 5 P. M., and about 11 P. M. retired to bed in apparently as good health as usual. About midnight he awoke with a violent fit of coughing upon him, and his wife becoming alarmed by the failure of domestic remedies to afford relief, called in Drs. H. W. Davis and R. A. Lewis, near neighbors and friends. On their arrival they found him still conscious, but frothy blood running from his mouth with each act of coughing, and other signs of active congestion of the lungs were evident. He became rapidly worse, and died at 1 : 15 A. M., being conscious up to a few minutes of his death.

Dr. Moore was born in Charleston, S. C., in 1815. After graduating in medicine in 1835, he entered the United States army as an assistant surgeon. In two or three years afterwards he rose to the rank of surgeon, and served as such at the West Point Military Academy, and then in the war with Mexico. After that war, he served as surgeon in the frontier Indian wars, when such a life was surrounded by hardships and perils. In the Mexican war his conduct was distinguished not only by gallantry on the field, but by great skill in the management of the great trusts committed to his charge. He remained a surgeon in the United States army until February, 1861, when he resigned his commission and entered the military service of South Carolina as surgeon. In the organization of the military staff of the Confederate states, Dr. Moore was appointed surgeon-general in June, 1861, in which capacity he served during the remainder of the war. After the war, Dr. Moore made his home in Richmond, Va., and, having ample means, did not enter into active practice. He became a member of the American Public Health Association in 1878.

Mr. J. W. LAMBERT, president of the Lambert Pharmacal Company, after an illness of one month, died January 6, 1889, at his home in St. Louis, Mo. He was attacked with a severe cold on December 7th, which was followed by nervous prostration, and his illness grew more serious from day to day until its fatal termination. For a long time past, in addition to the demands of his own private business, Mr. Lambert had devoted a great deal of time and labor to undertakings of a public character, and the result was a complete breaking down of his nervous system. In whatever he took part he devoted himself unsparingly to the work of making it a success, and his interest in such effort would become so great that he knew no rest until assured that success had been achieved.

Mr. Lambert was the son of B. H. Lambert, of Alexandria, Va., and was born at that place in March, 1852. He was a graduate of Randolph-Macon college, class of 1871. In 1873 he married Miss Winn, of Richmond, Va., and in the same year went to St. Louis, where for two years he was engaged in the assurance business. Afterwards he became the confidential man for the wholesale drug firm of A. A. Mellier, and remained with that concern for six years, when he left it in 1881 to establish the Lambert Pharmacal Company, of which he became president, and which he managed with signal ability and marked success, developing the best qualities of a successful business man.

During his residence in St. Louis Mr. Lambert was connected with nearly every public enterprise, and was of a most open-hearted and generous disposition, having many devoted friends. He was a prominent Mason, and at his death a member of the Washington Lodge, St. Louis, and chaplain of Ascalon Commandery of Knights Templar of that city, and also belonged to Alpha Council, Legion of Honor. He was elected to membership in the American Public Health Association in 1885.

Dr. DANIEL W. HAND, of St. Paul, Minn., died in that city, June 1, 1889, in his fifty-fifth year, of uraemia. Dr. Hand was born at Cape May Court House on the 18th day of August, 1834. He was a graduate of the university at Lewisburg, Pa., and subsequently graduated in medicine at the University of Pennsylvania with high honors. Dr. Hand went to St. Paul in March, 1857, where he practised his profession until July, 1861, when he volunteered his services and was appointed assistant surgeon to the 1st Minnesota Regiment; he was afterwards, by examination, appointed brigade surgeon. At Fair Oaks his horse was shot from under him, and he himself was wounded. May 18, 1863, he was captured and lodged in Libby Prison. He was, however, soon exchanged and transferred to Newbern, N. C., and for two years, from August 11, had charge of the medical department of the state. While medical director he rendered important services during a serious small-pox epidemic, which his quick action and stringent hygienic measures effectually checked.

In the month of September, 1864, yellow-fever broke out at Newbern; between September 6 and November 1 over 1,200 citizens perished, including eleven of the assistant surgeons. Dr. Hand alone escaped until the epidemic had almost subsided, when he also was stricken down. His recovery was rather a rapid one, but, unfortunately, left him with the kidney trouble which was the final cause of his death. In 1865 he was mustered out of service, with the rank of colonel.

He soon returned to St. Paul, where he practised medicine until his death. He was always at the head of any undertaking to better the standing of the profession in his state; was for a long time a member of the state examining board, and for many years president of the state board of health. He had the welfare of the people always at heart. He was a member of the American Medical Association, and had been a member of the American Public Health Association since 1878. His many kindnesses to the younger members of the profession, his uniform cordiality to the older, and his professional ability, made him the foremost of the consultants of the state. Scientific, conscientious, affable, energetic, he was an ideal physician, honored and beloved by all.

Dr. WALTER DE FOREST DAY, for many years sanitary superintendent of the board of health of New York city, died at his residence in that city on November 27, 1889. Although he had been suffering from an incurable illness since May, his death was sudden. Dr. Day was born in 1835, in Catskill, N. Y. He was graduated from Williams college in 1859, and soon after began the study of medicine in New York under the late Dr. Willard Parker. He was graduated in medicine from the College of Physicians and Surgeons in 1863, but two years earlier he entered the military service of the United States as a medical cadet, and immediately after the battle of Bull Run converted the Methodist church in Alexandria, Va., into a hospital for the treatment of the wounded. The efficiency with which he did this work gained for him the task of organizing the hospital service for the Army of the Potomac.

The proficiency he displayed in this field attracted the attention of Prof. Charles F. Chandler, who, when he was made president of the board of health of New York city in 1873, selected Dr. Day as the best equipped man for sanitary superintendent. He filled the chair of materia medica and botany in the College of Pharmacy for twenty-one years, and was for ten years clinical assistant to the professor of the practice of medicine of the College of Physicians and Surgeons. He was also connected, from time to time, with various hospitals and dispensaries, and was a member of several medical societies. He was elected to membership in the American Public Health Association in 1873.

Dr. DAVID PRINCE was born in Brooklyne, Windom county, Conn., June 20, 1816. Later he removed with his parents to Canandaigua, N. Y., where he was educated, and from which place he went to Cincinnati to study medicine as a pupil of the celebrated Dr. Muzzy. His father had in the meantime moved to Payson, Ill., and to that place the son followed when his education was completed. In 1845 he was appointed professor of anatomy in Illinois college, which position he held for several years. He then went to St. Louis, where he remained a few years practising, returning to Jacksonville, Ill., in 1852. He followed the practice of his profession for fifteen years, at the end of which time he established the sanitarium which has been of such vast benefit to suffering humanity.

During the war he was for over a year brigade surgeon in the Army of the Potomac, which position he filled with signal ability. He was a delegate to the International Medical Congress at London in 1881, and again at Copenhagen in 1884. He was a charter member of the American Association of Surgeons, and was held in high esteem by that eminent body. He was honored by the position of president of the Illinois State Medical Society, and was a prominent member of the American Association of Railroad Surgeons. He was elected to membership in the American Public Health Association in 1880.

He was the author of a treatise on Plastics and Orthopoedics, which has since been much used as a text-book. He wrote numerous valuable papers, which were widely published in the professional journals. He was a constant student, and did a great service to his fellowmen by devising the plan for supplying operating rooms with pure air. His skill as a surgeon was very great, and his professional triumphs can be counted by the hundred.

He was married in 1845 to Mary J. Dawson, by whom he had three children, all of whom died in infancy, the mother following in 1850. On May 10, 1852, he was married at Fredona, N. Y., to Miss Lucy M. Chandler. Three children were born to them,—Drs. A. E. and John A. Prince, of Jacksonville, Ill., and Mrs. Stella Stocker, of Duluth, Minn. During all his life Dr. Prince had enjoyed excellent health, and for nearly half a century he had been but once confined to his bed, and that was when suffering for a few days with an attack of pneumonia, over thirty years since. He was the friend peer of many eminent men. In his home he was most tender and affectionate, denying his loved ones nothing which he was able to grant them, and ever planning for their comfort and happiness. In public he was always ready to aid every good word and work. His voice and purse were always at the service of every deserving cause, and his labors in many ways were indefatigable. As an honored member of the board of education he devoted himself assiduously to the welfare of the rising generation. It may be fairly said of him that by the people generally he was more than ordinarily appreciated. His life and noble deeds are his best epitaph, and his most enduring monument will be the lasting gratitude and esteem of his fellow-citizens. Dr. Prince died December 19, 1889, at Jacksonville, Ill., after being ill with pneumonia five days.

Dr. James L. Cabell, senior member of the faculty of the University of Virginia, died at Overton, Va., August 13, 1889. He was born in Nelson county, Va., in August, 1813. He was for more than fifty years identified with the University of Virginia in its department of medicine. He was graduated at that university in 1833, and obtained his medical degree at the University of Maryland in 1834. He studied abroad and at home for three years, preparing himself for the professorship at Charlottesville, which came to him in 1837, when he was only twenty-four years of age. His first chair was that of anatomy and surgery. He continued with the university until the end of the session recently closed, when he retired to make room for his former pupil, Dr. Barringer, his health rendering the step expedient.

He was prominent in his State Medical Society, and in the American Public Health Association, becoming the presiding officer of each in

1876 and in 1878, respectively. He was chairman of the Health Conference at Washington during the epidemic of yellow-fever at Memphis. His eminence in the field of public hygiene led to his appointment as president of the National Board of Health, a position filled by him for several years with great advantage to the public service and to the cause of sanitary science in this country. He was the recipient of many honors, and a member of many important societies, nearly all of which profited, from time to time, by the contributions of his learning and ripe judgment. He was in his seventy-sixth year at the time of his decease. He had been a member of the American Public Health Association since 1872.

ANNUAL REPORT OF THE TREASURER.

Nashville, Tennessee, Treasurer of the American Public Health Association, October 22, 1889.

RECEIPTS.

Balance brought forward,	$783.74	
From annual fees of members,	1,665.00	
From sale of *Public Health*, net,	9.30	
From Henry Lomb, Esq., prize fund,	500.00	
From sale of *Disinfectants and Disinfection*,	194.80	
		$3,152.84

DISBURSEMENTS.

Printing, binding, and distributing Vol. XIV of *Public Health*,	$992.76	
Secretary's help,	250.00	
Treasurer's postage and help,	76.02	
Secretary's travelling expenses and postage,	267.30	
Treasurer's travelling expenses,	144.35	
Prize Essay, by Mrs. Mary Hinman Abel,	500.00	
Committee on Disinfectants,	4.35	
		$2,134.78
Balance to new account,		$1,018.06

The above expenditures were ordered by the Executive Committee, and vouchers are herewith submitted.

All of which is respectfully submitted by

J. Berrien Lindsley, *Treasurer*.

Examined and found correct.

E. P. Lachapelle.
Jas. F. Hibberd.
Geo. Homan.

CONSTITUTION

OF THE

AMERICAN PUBLIC HEALTH ASSOCIATION.

TITLE.

I. This Association shall be called "THE AMERICAN PUBLIC HEALTH ASSOCIATION."

OBJECTS.

II. The objects of this Association shall be the advancement of sanitary science, and the promotion of organizations and measures for the practical application of public hygiene.

MEMBERS.

III. The members of this Association shall be known as Active and Associate. The Executive Committee shall determine for which class a candidate shall be proposed. The *Active* members shall constitute the permanent body of the Association, subject to the provisions of the constitution as to continuance in membership. They shall be selected with special reference to their acknowledged interest in or devotion to sanitary studies and allied sciences, and to the practical application of the same. The *Associate* members shall be elected with special reference to their general interest only in sanitary science, and shall have all the privileges and publications of the Association, but shall not be entitled to vote.

Delegates from national, state, provincial, and municipal boards of health, organized sanitary associations, and the army, navy, and marine hospital service, shall be entitled to be enrolled as active members upon presentation of their credentials to the Executive Committee. Members, not delegates from such bodies, shall be elected as follows:

Each candidate for admission shall first be proposed to the Executive Committee, in writing (which may be done at any time), with a statement of the business or profession and special qualifications of the person so proposed. On recommendation of a majority of the committee, and on receiving a vote of two thirds of the members present at a regular meeting, the candidate shall be declared duly elected a member of the Association. The annual fee of membership in either class shall be five dollars.

OFFICERS.

IV. The officers shall be a President, a First and a Second Vice-President, a Secretary, and a Treasurer.

All the officers shall be elected by ballot, annually, except the Secretary, who shall be elected for a term of three years.

PRESIDING OFFICER.

V. The President, or in his absence one of the Vice-Presidents, or in their absence a chairman *pro tempore*, shall preside at all meetings of the Association. He shall preserve order, and shall decide all questions of order, subject to appeal to the Association. He shall also appoint all committees authorized by the Association, unless otherwise specially ordered.

SECRETARY.

VI. The Secretary shall have charge of the correspondence and records of the Association; and he shall also perform the duties of Librarian. He, together with the presiding officer, shall certify all acts of the Association. He shall, under the direction of the Executive Committee, give due notice of the time and place of all meetings of the Association, and attend the same. He shall keep fair and accurate records of all the proceedings and orders of the Association; and shall give notice to the several officers, and to the Executive and other Committees, of all votes, orders, resolves, and proceedings of the Association, affecting them or appertaining to their respective duties.

TREASURER.

VII. The Treasurer shall collect and take charge of the funds and securities of the Association. Out of these funds he shall pay such sums only as may be ordered by the Association, or by the Executive Committee. He shall keep a true account of his receipts and payments, and at each annual meeting render the same to the Association, when a committee shall be appointed to audit his accounts. If from the annual report of the Treasurer there shall appear to be a balance against the treasury, no appropriation of money shall be made for any object but the necessary current expenses of the Association, until such balance shall be paid.

STANDING COMMITTEES.

VIII. There shall be the following standing committees: (1) The Executive Committee, (2) the Advisory Council, (3) the Committee on Publication.

EXECUTIVE COMMITTEE.

IX. The Executive Committee shall consist (1) of the President, First Vice-President, Second Vice-President, Secretary, and Treasurer; (2) of six active members, of whom three shall be elected annually by ballot, to serve two years, and who shall be ineligible to reëlection for a second successive term; and (3) of the ex-Presidents of the Association.

It shall be the duty of the Executive Committee to consider and recommend plans for promoting the objects of the Association; to authorize the disbursement and expenditure of unappropriated moneys in the treasury for the payment of current expenses; to consider all applications for membership, and, at the regular meetings, report the names of such candidates as a majority shall approve; and, generally, to superintend the interests of the Association, and execute all such duties as may, from time to time, be committed to them by the Association. At least one month preceding the annual meeting of the Association, the Executive Committee shall cause to be issued to members a notice of such meeting, and they are authorized to publish the same in medical, scientific, and other periodicals, but without expense to the Association; and such notice shall contain the order of business to be followed at said meeting, and, briefly, the subjects to be presented, and the special points of discussion.

ADVISORY COUNCIL.

X. The Advisory Council shall consist of one member from each State, Territory, and District, the Army, Navy, and Marine Hospital Service, the Dominion of Canada, and each of the Provinces, who shall be appointed by the President on the last day of each session, and who, besides acting as nominating committee of officers for the ensuing year, to be announced at such time as the Executive Committee may appoint, shall consider such questions and make such recommendations to the Association as shall best secure the objects of the Association. They shall at their first meeting elect from their own number a Secretary, whose record of their proceedings shall be made part of the records of the Association.

COMMITTEE ON PUBLICATION.

XI. The Committee on Publication shall consist of the Secretary and two active members, selected by the Executive Committee, who shall contract for, arrange, and publish, under authority of the Executive Committee, the proceedings of the Association, including such papers as have been examined and approved by the Executive Committee, or which have been submitted to them by the latter for their discretionary action.

REPORTS AND PAPERS.

XII. All committees, and all members preparing scientific reports of papers to be laid before the Association at its annual meetings, must give, in writing, the title of such reports or papers, the time to be occupied in reading them, and an abstract of their contents, to the Executive Committee, at least one week preceding the date of such meeting, to secure their announcement in the order of business.

MEETINGS.

XIII. The time and place of each annual meeting shall be fixed at the preceding annual meeting, but may be changed by the Executive Committee for reasons that shall be specified in the announcement of the meeting. Special meetings may be called, at any time or place, by concurrence of two thirds of the Executive Committee. There shall be no election of officers, or change of By-Laws, or appropriation of money to exceed the amount at that time in the treasury, at such special meeting, except by a vote of a majority of all the members of the Association. Whenever a special meeting is to be held, at least one month's notice shall, if possible, be given by circular to all the members, together with the order of business.

QUORUM.

XIV. At the annual meeting nine members shall constitute a quorum for the election of officers, a change of the Constitution, the election of members, and the appropriation of moneys.

ORDER OF BUSINESS.

XV. The order of business at all meetings of the Association shall be fixed by the Executive Committee, and such order must be completed before any other business is introduced, except such order of business is suspended by a vote of four fifths present.

ALTERATION OF CONSTITUTION.

XVI. No alteration in the Constitution of the Association shall be made except at an annual meeting, nor unless such alteration shall have been proposed at a previous meeting, and entered on the minutes with the name of the member proposing the same, and shall be adopted by a vote of two thirds of the members present.

BY-LAWS OF THE EXECUTIVE COMMITTEE.

QUORUM.

1. Five members shall constitute a quorum for the transaction of such business as may come before the committee.

MEMBERS RESTRICTED.

2. No elective member of the Executive Committee shall be at the same time a member of the Advisory Council, if there is another member of the Association from his state or service.

PARLIAMENTARY USAGE.

3. Cushing's Law and Practice of Legislative Assemblies shall be the guide of parliamentary practice until otherwise ordered.

PAPERS.

4. All papers presented to the Association must be either printed, typewritten, or in plain handwriting, and be in the hands of the Secretary at least twenty days prior to the annual meeting, to insure their critical examination as to their fulfilling the requirements of the Association.

5. If any paper is too late for critical examination, said paper may be so far passed upon by the Executive Committee as to allow its reading, but such paper shall be subject to publication or non-publication, as the Executive Committee deem expedient.

6. All papers accepted by the Association, whether read in full, by abstract, by title, or filed, shall be delivered to the Secretary as soon as thus disposed of, as the exclusive property of the Association. Any paper presented to this Association and accepted by it shall be refused publication in the transactions of the Association, if it be published, in whole or in part, by permission or assent of its author, in any manner prior to the publication of the volume of transactions, unless written consent is obtained from the Publication Committee.

7. Day papers shall be limited to twenty minutes, and evening papers to thirty minutes, each.

DISCUSSION OF PAPERS.

8. After the leading papers on each subject, as indicated by the Executive Committee, have been read, discussion shall follow, and be confined strictly to the subject of these papers; and each speaker shall be limited

to ten minutes, and shall not speak a second time until after every other member who desires to be heard, and then only for five minutes, except by unanimous consent.

9. The Chair shall notify gentlemen who desire to speak to send up their names, and they shall be called on in the order sent up, and he may, at his discretion, limit the time of speaking to five instead of ten minutes, if in his judgment it may become necessary to do so in order to allow each one on the list an opportunity to be heard.

PUBLICATION COMMITTEE.

10. The Committee on Publication, charged with the duties of selecting and printing the papers and transactions of the Association, shall consist of three active members of the Association, and of whom one shall be the Secretary, appointed by the Executive Committee during the session of the Association, and selected with reference to their facilities of meeting.

11. All papers read by title, and others not definitely passed upon by the Executive Committee, shall be referred to the Publication Committee for critical examination; and said committee is authorized to reject such papers as in its judgment are not worthy of publication, and to omit such others as cannot be included within the limits of the annual volume.

12. The Publication Committee shall procure a copyright on the transactions in the name of the Association, and the committee shall have full charge of the publication of the transactions.

APPLICATION FOR MEMBERSHIP.

13. All applications for membership must be made upon the application blank of the Association.

14. Persons not members, having prepared papers to be presented at the meetings of the Association, shall be proposed for membership at the first business session of the Association.

EXPENDITURES.

15. All bills connected with the publication of the transactions shall, upon the approval of the chairman of the Publication Committee and the Secretary, be signed by the President of the Association, and paid by check of the Treasurer directly to the party concerned; and the President shall not approve any bill, relating either to publishing or printing, without the approval first of the chairman of the committee in charge thereof.

16. Bills for current expenses shall be first approved by the Secretary, then sent to the President, and on his approval they shall be paid by check of the Treasurer directly to the parties interested.

17. The actual and necessary travelling expenses of the Secretary and Treasurer to the annual meeting of the Association, and to one meeting of the Executive Committee, shall be classed as current expenses.

RESOLUTIONS.

18. All resolutions presented to the Association shall be sent to the Chair in writing, and referred to a committee without discussion.

ARREARAGES.

19. The arrearages of all members remitting their dues for two years shall be cancelled up to the date of the last payment, but they shall be entitled to the transactions of the Association only for the years for which they have actually paid.

AUDITING COMMITTEE.

20. An Auditing Committee shall be appointed by the Chair to audit the accounts of the Treasurer, and report upon the same.

OFFICERS AND COMMITTEES

OF THE

AMERICAN PUBLIC HEALTH ASSOCIATION.

ORGANIZATION, 1889–1890.

President, ...	Dr. HENRY B. BAKER, *Lansing, Mich.*
First Vice-President, .	Dr. FREDERICK MONTIZAMBERT, *Quebec, Canada.*
Second Vice-President,	Dr. JOSEPH H. RAYMOND, *Brooklyn, N. Y.*
Secretary, ...	Dr. IRVING A. WATSON, *Concord, N. H.*
Treasurer, ...	Dr. J. BERRIEN LINDSLEY, *Nashville, Tenn.*

(*Ex officio* members Executive Committee.)

STANDING COMMITTEES.

EXECUTIVE COMMITTEE.

(Elective.)

Dr. WALTER WYMAN	*U. S. M. H. S.*
Dr. J. F. KENNEDY	*Des Moines, Iowa.*
Dr. PETER H. BRYCE	*Toronto, Ont.*
Dr. LUCIEN F. SALOMON	*New Orleans, La.*
Dr. WILLIAM BAILEY	*Louisville, Ky.*
Dr. HENRY B. HORLBECK	*Charleston, S. C.*

(The ex-Presidents, *ex officio* members Executive Committee.)

Dr. STEPHEN SMITH	*New York City.*
Dr. JOSEPH M. TONER	*Washington, D. C.*
Dr. JOHN H. RAUCH	*Springfield, Ill.*
Major JOHN S. BILLINGS	*U. S. Army.*
Prof. ROBERT C. KEDZIE	*Lansing, Mich.*
Dr. EZRA M. HUNT	*Trenton, N. J.*
Dr. ALBERT L. GIHON	*U. S. Navy.*
Dr. JAMES E. REEVES	*Chattanooga, Tenn.*
Dr. HENRY P. WALCOTT	*Cambridge, Mass.*
Major GEORGE M. STERNBERG	*U. S. Army.*
Prof. CHARLES N. HEWITT	*Red Wing, Minn.*
Prof. HOSMER A. JOHNSON	*Chicago, Ill.*

ADVISORY COUNCIL.

Alabama, ...	Dr. JEROME COCHRAN, *Mobile.*
Arkansas, ...	Dr. H. C. DUNNAVANT, *Osceola.*
California, ...	Dr. JAMES SIMPSON, *San Francisco.*
Colorado, ...	Dr. A. A. CLOUGH, *Denver.*
Connecticut, ...	Prof. C. A. LINDSLEY, *New Haven.*
Dakota, ...	Dr. O. WELLINGTON ARCHIBALD, *Jamestown.*
Delaware, ...	Dr. LEWIS P. BUSH, *Wilmington.*
Florida, ...	DR. GEORGE T. MAXWELL, *Jacksonville.*

Georgia,	Dr. Eugene Foster, *Augusta.*
Illinois,	Dr. W. A. Haskell, *Alton.*
Indiana,	Dr. James F. Hibberd, *Richmond.*
Iowa,	Dr. A. W. Cantwell, *Davenport.*
Kansas,	Dr. Daniel C. Jones, *Topeka.*
Kentucky,	Dr. J. N. McCormack, *Bowling Green.*
Louisiana,	Dr. C. P. Wilkinson, *New Orleans.*
Maine,	E. C. Jordan, C. E., *Portland.*
Maryland,	Dr. John Morris, *Baltimore.*
Massachusetts,	Dr. S. H. Durgin, *Boston.*
Michigan,	Rev. D. C. Jacokes, *Pontiac.*
Minnesota,	Dr. S. S. Kilvington, *Minneapolis.*
Mississippi,	Dr. Wirt Johnston, *Jackson.*
Missouri,	Dr. George Homan, *St. Louis.*
Nebraska,	Dr. John B. Ralph, *Omaha.*
New Hampshire,	Dr. John J. Berry, *Portsmouth.*
New Jersey,	Dr. Ezra M. Hunt, *Trenton.*
New York,	Dr. Jerome Walker, *Brooklyn.*
North Carolina,	Dr. Thomas F. Wood, *Wilmington.*
Ohio,	Dr. Charles O. Probst, *Columbus.*
Pennsylvania,	Crosby Gray, *Pittsburgh.*
Rhode Island,	Dr. Charles H. Fisher, *Providence.*
South Carolina,	Dr. T. Grange Simons, *Charleston.*
Tennessee,	Dr. J. D. Plunkett, *Nashville.*
Texas,	Dr. Robert Rutherford, *Houston.*
Vermont,	Dr. Charles L. Allen, *Rutland.*
Virginia,	Dr. J. Grattan Cabell, *Richmond.*
West Virginia,	Dr. C. T. Richardson, *Charleston.*
Wisconsin,	Dr. J. T. Reeve, *Appleton.*
Dist. of Columbia,	D. E. Salmon, D. V. M., *Washington.*
U. S. Army,	Major John S. Billings, *Washington, D. C.*
U. S. Navy,	Medical Director Albert L. Gihon, *Brooklyn, N. Y.*
U. S. M. H. Service,	Surgeon John Godfrey, *Chicago, Ill.*
Dominion of Canada,	Dr. Charles W. Covernton, *Toronto.*
Province of Ontario,	Dr. Francis Rae, *Oshawa.*
Province of Quebec,	Henry R. Gray, *Montreal.*
Manitoba,	Dr. Wm. R. D. Sutherland, *Winnipeg.*
New Brunswick,	Dr. Wm. S. Harding, *St. John.*

PUBLICATION COMMITTEE.

The Secretary, *ex officio.*

Dr. Alfred F. Holt	*Cambridge, Mass.*
Dr. Granville P. Conn	*Concord, N. H.*

SPECIAL COMMITTEES.

ON THE POLLUTION OF WATER-SUPPLY.

Major Charles Smart, U. S. A.	Washington, D. C.
Dr. A. G. Young	Augusta, Maine.
Prof. Victor C. Vaughan	Ann Arbor, Mich.
Dr. John H. Rauch	Springfield, Ill.
Prof. W. W. Daniells	Madison, Wis.
Dr. F. P. Vandenbergh	Buffalo, N. Y.

(Final report to be made at the Charleston meeting, 1890.)

ON THE DISPOSAL OF GARBAGE AND REFUSE.

Dr. Samuel S. Kilvington	Minneapolis, Minn.
Mr. Crosby Gray,	Pittsburgh, Pa.
Dr. Louis Laberge	Montreal, P. Q.
Dr. Granville P. Conn	Concord, N. H.
Prof. Delos Fall	Albion, Mich.

(Final report to be made at the Charleston meeting, 1890.)

ON ANIMAL DISEASES AND ANIMAL FOOD.

D. E. Salmon, D. V. M.	Washington, D. C.
Dr. Ezra M. Hunt	Trenton, N. J.
Prof. James Law	Ithaca, N Y.
Dr. Henry F. Hoyt	St. Paul, Minn.
V. T. Atkinson, V. S.	Milwaukee, Wis.

(Final report to be made at the Charleston meeting, 1890.)

ON FORMS OF STATISTICS.

Dr. Henry B. Baker	Lansing, Mich.
Dr. Samuel W. Abbott	Wakefield, Mass.
Dr. Benjamin Lee	Philadelphia, Penn.
Prof. Charles A. Lindsley	New Haven, Conn.
Dr. Roscoe N. Jackson	Faribault, Minn.
Hon. Dr. Paquet	St. Cuthbert, P. Q.
Prof. W. W. Payne	Northfield, Minn.

ON PROTECTIVE INOCULATIONS IN INFECTIOUS DISEASES.

Major George M. Sternberg, U. S. A.	Baltimore, Md.
Dr. Henry P. Walcott	Cambridge, Mass.
Prof. William H. Brewer	New Haven, Conn.
Dr. William T. Councilman	Baltimore, Md.
Theobald Smith, D. V. M.	Washington, D. C.

ON RESOLUTIONS IN RELATION TO COMMISSIONER OF HEALTH.

Dr. Henry P. Walcott	Cambridge, Mass.
Col. J. M. Keating	Memphis, Tenn.
Dr. J. N. McCormack	Bowling Green, Ky.
Dr. J. Berrien Lindsley	Nashville, Tenn.
Medical Director Albert L. Gihon, U. S. N.	Brooklyn, N. Y.

ON SANITARY AND MEDICAL SERVICE ON EMIGRANT SHIPS.

Dr. Samuel H. Durgin	Boston, Mass.
Medical Director Albert L. Gihon, U. S. N.	Brooklyn, N. Y.
Dr. Frederick Montizambert	Quebec, P. Q.
Dr. Walter Wyman	U. S. M. H. S.
Dr. C. P. Wilkinson	New Orleans, La.

ON THE CAUSE AND PREVENTION OF DIPHTHERIA.

Dr. G. C. Ashmun	Cleveland, Ohio.
Dr. F. H. Colton	Brooklyn, N. Y.
Dr. A. W. Cantwell	Davenport, Iowa.
Dr. Peter H. Bryce	Toronto, Ont.
Dr. William T. Councilman	Baltimore, Md.

ON CAUSES AND PREVENTION OF INFANT MORTALITY.

Dr. Jerome Walker	Brooklyn, N. Y.
Dr. E. H. Janes	New York City.
Dr. Geo. H. Rohé	Baltimore, Md.
Dr. R. O. Beard	Minneapolis, Minn.
Dr. Victor C. Vaughan	Ann Arbor, Mich.

ON INCORPORATION.

Dr. Henry B. Baker, *President*	Lansing, Mich.
Dr. Irving A. Watson, *Secretary*	Concord, N. H.
Dr. J. Berrien Lindsley, *Treasurer*	Nashville, Tenn.
Maj. Charles Smart, U. S. A.	Washington, D. C.
Colonel J. H. Baxter, U. S. A.	Washington, D. C.
Surgeon-General John M. Browne, U. S. N.	Washington, D. C.
Dr. Smith Townshend	Washington, D. C.
Samuel A. Robinson	Washington, D. C.

LOCAL COMMITTEE OF ARRANGEMENTS.

Dr. H. B. Horlbeck	Charleston, S. C.

(With power to select other members.)

DELEGATES TO INTERNATIONAL MEDICAL CONGRESS.

Medical Director Albert L. Gihon, U. S. N.	Brooklyn, N. Y.
Dr. Paul H. Kretzschmar	Brooklyn, N. Y.

LIST OF MEMBERS ELECTED AT THE SEVENTEENTH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, HELD AT BROOKLYN, N. Y., OCTOBER 22–25, 1889.

ACTIVE.

Dr. Alex. C. Abbott, Assistant in Pathology in Johns Hopkins University	Baltimore, Md.
Julius W. Adams, C. E., Congress St.	Brooklyn, N. Y.
Prof. Edmund R. Angell, Chemist	Derry, N. H.
Hon. Edward Atkinson	Boston, Mass.
Prof. W. O. Atwater, Director of Experimental Station U. S. Department of Agriculture	Washington, D. C.
Dr. Benjamin Franklin Beardsley, Physician and Surgeon, 90 Edwards St.	Hartford, Conn.
Dr. J. A. Beaudrey, 65 St. Denis St.	Montreal, P. Q.
Dr. Frederick Becker, Member Iowa State Board of Health	Clermont, Ia.
George N. Bell, C. E.	Philadelphia, Pa.
Dr. William T. Bishop, Medical Examiner Pa. R. R. Co., 211 Pine St.	Harrisburg, Pa.
Dr. Mary Taylor Bissell, Teacher of Physical Culture and Lecturer on Hygiene, Woman's Medical College, 19 East 46th St.	New York City.
C. H. Blackburn, Esq., Attorney at Law, 512 Colerain Ave.	Cincinnati, Ohio.
Dr. Thomas Blauch Bloomfield	Westbrook, Conn.
Benjamin Meade Bolton, Bacteriologist, Director of Bacteriological Dept. Hoagland Laboratory, Montague St.	Brooklyn, N. Y.
Dr. Charles W. Bray, 81 Free St.	Portland, Me.
Dr. M. D. Brocher, Professor of Hygiene, 130 St. Francis St.	Quebec, P. Q.
Dr. C. B. Burr, Medical Superintendent Eastern Michigan Asylum for the Insane, Asylum St.	Pontiac, Mich.
Dr. Walter H. Chapin, Clerk Board of Health, 675 State St.	Springfield, Mass.
Dr. A. A. Clough, Health Commissioner, City Hall	Denver, Col.
Dr. F. H. Colton	Brooklyn, N. Y.
Dr. Isaac Cooper, 194 Broad St.	Trenton, N. J.
Dr. John Clark Corbus, Member State Board of Charities	Mendota, Ill.
Julius Cotz, Sanitary Engineer, Member Board of Health, 2025 Atlantic Ave.	Atlantic City, N. J.
Dr. Frank E. Davis, 354 W. 22d St.	New York City.
Dr. Louis Shepard DeForest, Member Board of Health, 261 Orange St.	New Haven, Conn.

Dr. William Deming, Health Officer and President Board of Health . . . Litchfield, Conn.
George Albert Drake, Health Officer . . . Rozellville, Wis.
Dr. Cyrus Edson, Chief Inspector of Vaccination and Contagious Diseases, N. Y. Health Department, 54 W. 9th St. . . . New York City.
Prof. Delos Fall, Professor of Chemistry and Biology, Albion College, Member State Board of Health, 110 Iowa Ave. . . . Albion, Mich.
Dr. Edwin Farnham, Medical Inspector Board of Health, 4 Story St. . . . Cambridge, Mass.
Dr. James Brainerd Field, Chairman Board of Health, 243 Westford St. . . . Lowell, Mass.
Richard Fitz Gibbon, Health Officer, 366 Noble Ave. . . . Bridgeport, Conn.
William S. French, C. E., Clerk and Agent Board of Health, City Hall . . . West Newton, Mass.
Dr. James G. Gregory . . . Norwalk, Conn.
Dr. William Edward Griffiths, 320 Schermerhorn St. . . . Brooklyn, N. Y.
Dr. H. D. Geddings, Asst. Surg. U. S. M. H. S., Quarantine Station, Tortugas . . . Key West, Fla.
Dr. John Henry Granniss, Commissioner of Pharmacy . . . Old Saybrook, Conn.
Dr. Alexander Hadden, 155 E. 51st St. . . . New York City.
Dr. Lucy M. Hall, 181 Joralemon St. . . . Brooklyn, N. Y.
J. M. Hazen, Inspector of Buildings, 1512 Park Ave. . . . Minneapolis, Minn.
Dr. Arthur Hazlewood, Member State Board of Health . . . Grand Rapids, Mich.
Dr. C. C. Hunt, Physician and Surgeon . . . Dixon, Ill.
Dr. Fred N. Hunt, Health Officer, President U. S. Examining Board . . . Fairmont, Minn.
Dr. Joseph H. Hunt, Quincy St. Cor. Bedford Ave. . . . Brooklyn, N. Y.
Dr. Alexander Hutchins, 796 De Kalb Ave. . . . Brooklyn, N. Y.
Dr. R. N. Jackson . . . Faribault, Minn.
C. F. Johnson, Stenographer, 3 to 9 Beekman St. . . . New York City.
Dr. Leander P. Jones, Health Officer . . . Greenwich, Conn.
George T. Kemp, Ph. D., Instructor and Laboratory Director Physiology and Experimental Therapeutics, Hoagland Laboratory, 173 Joralemon St. . . . Brooklyn, N. Y.
Dr. Paul H. Kretzschmar, 402 Washington Ave. . . . Brooklyn, N. Y.
Dr. John Barr Lerned, High St. . . . Florence, Mass.
Wallace Goold Levison, Teacher, 317 Livingston St. . . . Brooklyn, N. Y.
Dr. Henry Minton Lewis, Surgeon to Brooklyn Homoeopathic Hospital, 171 Remsen St. . . . Brooklyn, N. Y.
Dr. John B. Linehan, Assistant to Chief Inspector of Vaccination, N. Y. Health Department, 301 Mott St. . . . New York City.
Dr. Chauncey E. Low, Lecturer on Anatomy New York Homoeopathic Medical College and Hospital, 110 Remsen St. . . . Brooklyn, N. Y.
Hon. Seth Low, President Columbia College, 201 Columbia Heights . . . Brooklyn, N. Y.
Dr. Hugh W. MacKay, Member Board or Health . . . Woodstock, Ont.
Dr. John T. McLean, Health Officer . . . Alameda, Cal.

William Storrs MacHarg, C. E., 14 Pacific Ave. . . . . . Chicago, Ill.

Edward F. Martin, Chemist and Chief Inspector of Offensive Trades, N. Y. Health Department, 301 Mott St. . New York City.

Dr. Albert Marois, 51 St. Louis St. . . . . Quebec, P. Q.

Dr. George Troup Maxwell, 63 Laura St. . . . . . . Jacksonville, Fla.

Dr. Ezra Spencer McClellan, 108 Haledon Ave. . . . . Paterson, N. J.

Dr. Calvin Davis McDonald, City Physician and Sanitary Superintendent, 1114 Grand Ave. . . . . . . Kansas City, Mo.

Dr. John Little Moffat, Associate Editor North American Journal of Homoeopathy, Secretary N. Y. State Homoeopathic Medical Society, 17 Schermerhorn St. . . . Brooklyn, N. Y.

Dr. Reuben Curtis Moffat, 17 Schermerhorn St. . . . . Brooklyn, N. Y.

Dr. Prince A. Morrow, 66 W. 40th St. . . . . New York City.

William F. Morse, S. E., 30 State St. . . . . New York City.

Dr. Eliza M. Mosher, 181 Joralemon St. . . . . . . Brooklyn, N. Y.

Dr. Byron Wooster Munson, Superintendent and Surgeon of Fitch's Home for Soldiers . . . . Noroton, Conn.

Dr. R. D. Mussey, Health Officer . . . . Glendale, Ohio.

Dr. Frank Parsons Norbury, Assistant Physician Illinois Central Hospital for Insane . . . . Jacksonville, Ill.

Dr. Frank Kittredge Paddock, Medical Examiner, 3 East St. . . . . Pittsfield, Mass.

Dr. A. H. Paquet . . . . St. Cuthbert, P. Q.

Dr. J. H. Phillips, Member State Board of Health . . . . Preston, Minn.

Hon. Edwin L. Pillsbury, Member Board of Health, 12 Beacon St. . . . . Boston, Mass.

Dr. J. B. Ralph . . . . Omaha, Neb.

Dr. John B. Robinson, City Physician, Secretary Board of Health . . . . Omaha, Neb.

Prof. Franklin C. Robinson, Professor of Chemistry, Bowdoin College, Member State Board of Health . . . . Brunswick, Me.

Dr. Francis J. Rogers, Health Officer, 22 Atlantic St. . . Stamford, Conn.

Edgar Richards, Chemist (Microscopist), Office of Internal Revenue, Treasury Department . . . . . . Washington, D. C.

Dr. Chas. Henry Shepard, 81 and 83 Columbia Heights . . Brooklyn, N. Y.

George W. Sheppard, Secretary Board of Health, 1600 Pacific Ave. . . . . Atlantic City, N. J.

Dr. William H. Shipps, Secretary Board of Health, 147 Farnsworth St. . . . . Bordentown, N. J.

Dr. Maxwell Gayley Simpson, Medical Examiner, Pa. R. R. Co., 81 Grand St. . . . . Jersey City, N. J.

Dr. Hugh Montgomery Smith, 78 Orange St. . . . . . Brooklyn, N. Y.

Rev. Samuel G. Smith, Ph. D., D. D., Member Minnesota Board of Corrections and Charities, 595 Ashland Ave. . St. Paul, Minn.

Dr. Byron Stanton, Health Officer, 157 Dayton St. . . . Cincinnati, Ohio.

Dr. Charles Sutherland, Colonel and Surgeon U. S. Army . . . . Governor's Island, N. Y.

Dr. Frank Swallow, Member State Board of Health . . Valley Falls, Kan.

Dr. J. P. Thomas . . . . Pembroke, Ky.

Dr. A. D. R. Thrane, Member State Board of Health, . . Eau Claire, Wis.

Dr. Roger S. Tracy, Registrar of Records, Health Department, 67 W. 37th St.	New York City.
Dr. Joshua Marsden Van Cott, Jr., Pathologist and Lecturer on Histology and Pathological Anatomy to the Long Island College Hospital, 188 Henry St.	Brooklyn, N. Y.
Dr. E. P. Vollum, Surgeon U. S. Army, Assistant Medical Purveyor, Broadway	New York City.
Dr. F. L. Von Suessmilch	Delavan, Wis.
Dr. Jerome Walker, 8 7th Ave.	Brooklyn, N. Y.
Dr. D. A. Wallace, Superintendent North Texas Insane Hospital	Terrell, Tex.
Dr. John O. Webster, Member State Board of Health, 59 State St.	Augusta, Me.
Dr. Henry M. Wells, Medical Inspector U. S. Navy, Director in charge of Naval Museum of Hygiene,	Washington, D. C.
Alfred T. White, 40 Remsen St.	Brooklyn, N. Y.
William Augustus White, 158 Columbia Heights	Brooklyn, N. Y.
Dr. C. P. Wilkinson	New Orleans, La.
Elisha Winter, Editor, 179 Quincy St.	Brooklyn, N. Y.
Dr. Franklin W. Wright, Health Officer, 48 Pearl St.	New Haven, Conn.
Andrew Young, Sanitary Inspector Health Department	Chicago, Ill.

ASSOCIATE.

Alexander L. Patrick, Manufacturer of Garbage Furnaces, 102 Bogg St.	Detroit, Mich.

REVISED LIST OF MEMBERS

AMERICAN PUBLIC HEALTH ASSOCIATION,

1890.

This list includes all those who have maintained their membership to the present time, excepting those elected at Brooklyn, which list will be found in another place. The Secretary should be notified of any errors or omissions.

PRESIDENTS OF THE ASSOCIATION.

Stephen Smith, M. D.	1872, '73, '74.
Joseph M. Toner, M. D.	1875.
* Edwin M. Snow, M. D.	1876.
John H. Rauch, M. D.	1877.
* Elisha Harris, M. D.	1878.
* James L. Cabell, M. D.	1879.
John S. Billings, M. D.	1880.
* Charles B. White, M. D.	1881.
Robert C. Kedzie, M. D.	1882.
Ezra M. Hunt, M. D.	1883.
Albert L. Gihon, M. D.	1884.
James E. Reeves, M. D.	1885.
Henry P. Walcott, M. D.	1886.
George M. Sternberg, M. D.	1887.
Charles N. Hewitt, M. D.	1888.
Hosmer A. Johnson, M. D.	1889.
Henry B. Baker, M. D.	1890.

ACTIVE MEMBERS.

Dr. Samuel W. Abbott	Wakefield, Mass.	1882.
Dr. C. A. Abernathy	Pulaski, Tenn.	1885.
Dr. J. F. A. Adams	Pittsfield, Mass.	1881.
John K. Allen	Chicago, Ill.	1883.
Dr. Willis G. Alling	New Haven, Conn.	1885.
James Allison, Esq.	Cincinnati, Ohio.	1884.
Dr. Austin White Alvord	Battle Creek, Mich.	1887.
Dr. Charles Ambrook	Boulder, Col.	1878.
Dr. Azel Ames, Jr.	Chicago, Ill.	1875.
Dr. A. A. Ames	Minneapolis, Minn.	1887.
George T. Angell, Esq.	Boston, Mass.	1878.
Dr. O. W. Archibald	Jamestown, N. D.	1888.
Dr. S. T. Armstrong, U. S. M. H. S.	New Orleans, La.	1882.

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* Deceased.

Dr. J. S. Arwine	Columbus, Ind.	1882.
Dr. G. C. Ashmun	Cleveland, Ohio.	1881.
V. T. Atkinson, V. S.	Milwaukee, Wis.	1888.
Dr. William Bailey	Louisville, Ky.	1879.
Dr. P. H. Bailhache, U. S. M. H. S.	Philadelphia, Pa.	1874.
Dr. George Baird,	Wheeling, W. Va.	1886.
Dr. Henry B. Baker	Lansing, Mich.	1873.
Dr. Henry I. Bahnson	Salem, N. C.	1888.
Dr. Lewis Balch	Albany, N. Y.	1888.
Dr. Milton C. Baldridge	Huntsville, Ala.	1878.
Dr. T. G. Barnhill	Findlay, Ohio.	1882.
James W. Bartlett	Dover, N. H.	1888.
Edward Bausch	Rochester, N. Y.	1884.
Dr. J. H. Baxter, U. S. A.	Washington, D. C.	1876.
Dr. William Bayard	St. John, N. B.	1886.
Dr. R. O. Beard	Minneapolis, Minn.	1888.
Dr. W. F. Becker	Milwaukee, Wis.	1888.
Dr. D. H. Beckwith	Cleveland, Ohio.	1884.
Dr. Henry E. Beebe	Sidney, Ohio.	1882.
Dr. A. N. Bell	Brooklyn, N. Y.	1872.
Dr. Harry Kent Bell	Brooklyn, N. Y.	1888.
Dr. John J. Berry	Portsmouth, N. H.	1886.
Dr. John S. Billings, U. S. A.	Washington, D. C.	1872.
Dr. John E. Black	Memphis, Tenn.	1887.
Dr. Emily Blackwell	New York City.	1873.
E. W. Blatchford	Chicago, Ill.	1876.
Dr. Delevan Bloodgood, U. S. N.	Brooklyn, N. Y.	1888.
Archibald Blue	Toronto, Ont.	1886.
Dr. Frans H. Bodenius	Madison, Wis.	1888.
C. E. Booth	Winnebago, Wis.	1888.
Dr. Henry I. Bowditch	Boston, Mass.	1876.
Frederick N. Boxer, C. E.	Montreal, P. Q.	1885.
Dr. J. R. Bratton	Yorkville, S. C.	1886.
Dr. B. C. Brett	Green Bay, Wis.	1885.
Prof. William H. Brewer	New Haven, Conn.	1874.
Dr. A. H. Briggs	Buffalo, N. Y.	1886.
Dr. William Brodie	Detroit, Mich.	1873.
G. P. Brown	Chicago, Ill.	1885.
Joseph O. Brown	Pittsburgh, Pa.	1888.
Dr. John M. Browne, U. S. N.	Washington, D. C.	1883.
Dr. Peter H. Bryce	Toronto, Ont.	1883.
Dr. Erastus J. Buck	Platteville, Wis.	1888.
Hon. A. F. Burr	New Haven, Conn.	1886.
Dr. P. Palmer Burrows	Lindsay, Ont.	1886.
Dr. Lewis P. Bush	Wilmington, Del.	1879.
Dr. J. Grattan Cabell	Richmond, Va.	1873.
Dr. Allan Cameron	Owen Sound, Ont.	1886.
Dr. Irving H. Cameron	Toronto, Ont.	1886.
Dr. Henry F. Campbell	Augusta, Ga.	1879.
Dr. James Campbell	Hartford, Conn.	1888.

Dr. William Canniff	Toronto, Ont.	1883.
Dr. G. M. D. Cantrell	Little Rock, Ark.	1881.
Dr. A. W. Cantwell	Davenport, Iowa.	1880.
Dr. John M. Carberry	Waukesha, Wis.	1888.
Prof. Stanford E. Chaillé	New Orleans, La.	1874.
Dr. Charles W. Chancellor	Baltimore, Md.	1875.
Prof. C. F. Chandler	New York City.	1872.
Dr. Charles V. Chapin	Providence, R. I.	1886.
Hon. J. W. Clapp	Memphis, Tenn.	1879.
Dr. Edwin Clark	Buffalo, N. Y.	1888.
Dr. Henry H. Clark	McGregor, Iowa.	1888.
Dr. E. F. X. Cleveland	Dundee, Ill.	1887.
Dr. E. A. Cobleigh	Chattanooga, Tenn.	1887.
Dr. Jerome Cochran	Mobile, Ala.	1878.
Dr. Charles E. Cole	Wauzeka, Wis.	1888.
Dr. Edward W. Cole	Nashville, Tenn.	1887.
Dr. N. B. Cole	Bloomington, Ill.	1888.
Dr. Berthold M. J. Conlin	Alexandria, S. D.	1888.
Dr. G. P. Conn	Concord, N. H.	1875.
Dr. P. S. Conner	Cincinnati, Ohio.	1884.
Dr. Henry J. Connor	West Superior, Wis.	1888.
Dr. George Cook	Concord, N. H.	1885.
Dr. W. C. Cook	Nashville, Tenn.	1879.
George W. Cooley, C. E.	Minneapolis, Minn.	1887.
Dr. W. A. H. Coop	Friendship, Tenn.	1887.
Hon. W. F. Cooper	Nashville, Tenn.	1879.
Dr. W. T. Councilman	Baltimore, Md.	1887.
Dr. John Coventry	Windsor, Ont.	1886.
Dr. C. W. Covernton	Toronto, Ont.	1884.
Dr. T. S. Covernton	Toronto, Ont.	1884.
Dr. G. G. Craig	Rock Island, Ill.	1880.
Dr. J. Harvey Craig	Mansfield, Ohio.	1886.
Dr. J. W. Craig	Mansfield, Ohio.	1884.
Dr. Samuel M. Crawford	Lancaster, Pa.	1888.
Dr. W. H. Cretcher	Bellefontaine, Ohio.	1886.
J. James R. Croes, C. E.	New York City.	1877.
Dr. David M. Currier	Newport, N. H.	1883.
Samuel G. Curry	Toronto, Ont.	1886.
Dr. F. C. Curtis	Albany, N. Y.	1883.
Dr. Charles O. Curtman	St. Louis, Mo.	1884.
T. G. Dabney, C. E.	Memphis, Tenn.	1887.
Dr. Jacob M. DaCosta	Philadelphia, Pa.	1874.
Dr. J. P. Dake	Nashville, Tenn.	1879.
Dr. F. E. Daniel	Austin, Tex.	1884.
Prof. W. W. Daniells	Madison, Wis.	1886.
Dr. H. C. Darby	Wilmot, Wis.	1888.
Dr. Hiram H. Darr	Caldwell, Tex.	1883.
Dr. James Darrach	Germantown, Pa.	1874.
Dr. B. F. Davenport	Boston, Mass.	1884.
Dr. Alexander Davidson	Toronto, Ont.	1886.

Dr. J. A. Davies	Alpika, Miss.	1887.
Chester B. Davis, C. E.	Chicago, Ill.	1886.
Dr. N. S. Davis	Chicago, Ill.	1887.
Dr. Robert C. Davis	Seneca, S. C.	1887.
Dr. Dwight W. Day	Eau Claire, Wis.	1888.
Dr. Dexter V. Dean	St. Louis, Mo.	1880.
Dr. F. F. DeDecky	Sacramento, Cal.	1882.
Dr. Giovanni Del Orto	New Orleans, La.	1880.
Dr. William Deming	Litchfield, Conn.	1888.
Dr. Laban Dennis	Newark, N. J.	1877.
Dr. John W. Detwiller	Bethlehem, Pa.	1882.
Dr. Gustavus Devron	New Orleans, La.	1878.
Dr. Oscar C. DeWolf	Chicago, Ill.	1880.
Dr. Charles C. Dewstoe	Cleveland, Ohio.	1885.
David B. Dick	Toronto, Ont.	1886.
Hon. Perez Dickinson	Knoxville, Tenn.	1881.
Dr. W. H. Dickinson	Des Moines, Iowa.	1881.
Dr. William S. Disbrow	Newark, N. J.	1885.
William E. Dodge, Jr.	New York City.	1874.
Dr. Francis Donaldson	Baltimore, Md.	1885.
Dr. G. A. Doren	Columbus, Ohio.	1885.
Dr. John C. Dozier	Birmingham, Ala.	1887.
Dr. Thomas M. Drown	Boston, Mass.	1887.
Dr. Charles B. Dudley	Altoona, Pa.	1888.
Dr. John E. Duffel	Donaldsonville, La.	1880.
Dr. Samuel P. Duffield	Detroit, Mich.	1887.
Dr. J. C. Dunn	Pittsburgh, Pa.	1885.
Dr. H. C. Dunnavant	Osceola, Ark.	1882.
W. P. Dunwoody	Washington, D. C.	1884.
Dr. S. H. Durgin	Boston, Mass.	1875.
Hon. L. B. Eaton	Memphis, Tenn.	1880.
Dr. Frederick Edminster	Brooklyn, N. Y.	1885.
Dr. John B. Edwards	Mauston, Wis.	1888.
Dr. Joseph F. Edwards	Philadelphia, Pa.	1884.
Dr. E. R. Eggleston	Cleveland, Ohio.	1882.
Dr. Edward F. Elbridge	New London, Wis.	1888.
Dr. C. S. Elliot	Orillia, Ont.	1886.
Dr. William H. Elliott	Savannah, Ga.	1878.
Dr. John Elsner	Denver, Col.	1887.
Dr. David Engelman	Easton, Pa.	1886.
Andrew Engle	Des Moines, Iowa.	1888.
Dr. Frank W. Epley	New Richmond, Wis.	1888.
Dr. L. A. Falligant	Savannah, Ga.	1881.
A. B. Farquhar, Esq.	York, Pa.	1880.
Dr. Charles Farquhar	Olney, Md.	1885.
Dr. John E. Fell	Buffalo, N. Y.	1886.
Edward S. Fenner, Esq.	New Orleans, La.	1879.
Dr. H. V. Ferrell	Cartersville, Ill.	1887.
Dr. J. D. Fields	Manor, Tex.	1880.
Dr. Charles H. Fisher	Providence, R. I.	1881.

L. C. Fisher, Esq.	Galveston, Tex.	1878.
Gustave Fleischmann	Buffalo, N. Y.	1888.
Henry A. Fleischmann	New York City.	1888.
Dr. Oscar A. Fliesburg	Hudson, Wis.	1888.
Dr. Corydon L. Ford	Ann Arbor, Mich.	1872.
Dr. Peter R. Ford	Memphis, Tenn.	1887.
Dr. William H. Ford	Philadelphia, Pa.	1874.
Dr. Felix Formento	New Orleans, La.	1880.
Dr. Eugene Foster	Augusta, Ga.	1881.
Dr. Charles J. Fox	Willimantic, Conn.	1887.
Dr. H. D. Fraser	Charleston, S. C.	1880.
Dr. Spencer M. Free	Beechtree, Pa.	1885.
Dr. Edwin M. Fuller	Bath, Me.	1886.
Dr. Andrew L. Fulton	Kansas City, Mo.	1887.
Dr. John F. Fulton	St. Paul, Minn.	1888.
Prof. James T. Gardner	Albany, N. Y.	1875.
Dr. J. D. Gatch	Lawrenceburg, Ind.	1879.
Dr. Franklin Gauntt	Burlington, N. J.	1885.
Dr. John B. C. Gazzo	Thibodeaux, La.	1887.
William Paul Gerhard, C. E.	New York City.	1880.
Dr. Frederick H. Gerrish	Portland, Me.	1885.
Prof. Wolcott Gibbs	Cambridge, Mass.	1876.
Dr. Albert L. Gihon, U. S. N.	Brooklyn, N. Y.	1876.
Dr. Alfred C. Girard, U. S. A.	Fort Niagara, N. Y.	1874.
Dr. R. S. Goodwin	Thomaston, Conn.	1886.
Dr. E. E. Graves	Boscawen, N. H.	1886.
Crosby Gray	Pittsburgh, Pa.	1874.
Henry R. Gray	Montreal, P. Q.	1886.
Dr. John J. Green	Pittsburgh, Pa.	1884.
Gen. Colton Greene	Memphis, Tenn.	1880.
Dr. John C. Greenewalk	Camden, N. J.	1888.
Dr. Edgerton Griffin	Brantford, Ont.	1886.
Dr. John Griffin	Brooklyn, N. Y.	1888.
Dr. W. C. Griswold	Memphis, Tenn.	1887.
Dr. J. C. Gronvold	Norway, Minn.	1886.
Dr. Richard Gundry	Catonsville, Md.	1878.
A. D. Gwynn	Memphis, Tenn.	1880.
Hon. D. P. Hadden	Memphis, Tenn.	1880.
Dr. Junius M. Hall	Chicago, Ill.	1880.
Dr. John B. Hamilton, U. S. M. H. S.	Washington, D. C.	1886.
Dr. R. A. Hardin	Nashville, Tenn.	1879.
Dr. W. S. Harding	St. John, N. B.	1886.
Dr. Robert B. S. Hargis	Pensacola, Fla.	1878.
Dr. James F. Harrison	University of Virginia, Va.	1878.
Dr. Henry Hartshorne	Germantown, Pa.	1872.
Dr. W. A. Haskell	Alton, Ill.	1883.
Dr. B. Hatchett	Fort Smith, Ark.	1887.
Dr. Thomas Hay	Philadelphia, Pa.	1874.
Dr. Benjamin F. Hepler	Fort Scott, Kan.	1887.
Rudolph Hering, C. E.	New York City.	1878.

Dr. Stephen S. Herrick	New Orleans, La.	1878.
Dr. George D. Hersey	Providence, R. I.	1885.
Dr. Charles N. Hewitt	Red Wing, Minn.	1872.
Dr. D. C. Hewson	Orange, Tex.	1880.
Dr. J. F. Hibberd	Richmond, Ind.	1881.
Dr. John F. Hicks	Menominee, Mich.	1888.
Prof. Edward Hitchcock	Amherst, Mass.	1877.
Dr. Cornelius N. Hoagland	Brooklyn, N. Y.	1887.
Dr. John U. Hobach	Baltimore, Md.	1888.
Dr. Knut Hoegh	La Crosse, Wis.	1882.
Dr. Alfred F. Holt	Cambridge, Mass.	1885.
Dr. Joseph Holt	Portland, Or.	1880.
Dr. Henry D. Holton	Brattleboro, Vt.	1875.
Dr. George Homan	St. Louis, Mo.	1879.
Dr. Louis d'Homergue	Brooklyn. N. Y.	1887.
Dr. H. B. Horlbeck.	Charleston, S, C.	1880.
Dr. Asa Horr	Dubuque, Iowa.	1872.
Dr. Carl H. Horsch	Dover, N. H.	1883.
Dr. Henry F. Hoyt	St. Paul, Minn.	1884.
Dr. A. Clark Hunt	Metuchen, N. J.	1888.
Dr. Ezra M. Hunt	Trenton, N. J.	1872.
Dr. C. H. Hunter	Minneapolis, Minn.	1888.
Dr. H. M. Hurd	Baltimore, Md.	1883.
Dr. John W. Jackson	Kansas City, Mo.	1884.
Rev. D. C. Jacokes, S. T. D.	Pontiac, Mich.	1882.
Dr. Bushrod W. James	Philadelphia, Pa.	1878.
Dr. Edward H. Janes	New York City.	1872.
Dr. George W. Jenkins	Kilbourn City, Wis.	1888.
Dr. Andrew J. B. Jenner	Detroit, Mich.	1883.
Dr. Hosmer A. Johnson	Chicago, Ill.	1872.
Dr. Sam C. Johnson	Hudson, Wis.	1884.
Dr. Wirt Johnston	Jackson, Miss.	1878.
Dr. D. C. Jones	Topeka, Kan.	1887.
Dr. E. Utley Jones	Taunton, Mass.	1881.
Dr. H. Isaac Jones	San Francisco, Cal.	1880.
Dr. J. W. Jones	Tarborough, N. C.	1885.
Edward C. Jordan, C. E.	Portland, Me.	1886.
Hon. J. M. Keating	Memphis, Tenn.	1880.
Dr. Robert C. Kedzie	Lansing, Mich.	1873.
Dr. J. H. Kellogg	Battle Creek, Mich.	1878.
Dr. J. F. Kennedy	Des Moines, Iowa.	1885.
Dr. Isaac N. Kerlin	Elwyn, Pa.	1874.
Dr. Samuel S. Kilvington	Minneapolis, Minn.	1887.
Dr. G. M. Kimball	Concord, N. H.	1886.
Dr. Charles F. King	Hudson, Wis.	1888.
Dr. H. W. Kitchen	Cleveland, Ohio.	1881.
Dr. William F. Knox	McKeesport, Pa.	1887.
Dr. Cornelius Kollock	Cheraw, S. C.	1884.
Emil W. Krackowizer	Milwaukee, Wis.	1888.
Emil Kuichling, C. E.	Rochester, N. Y.	1882.

Dr. Louis Laberge	Montreal, P. Q.	1886.
Dr. Emanuel P. Lachappelle	Montreal, P. Q.	1887.
Dr. S. W. Latta	Trenton, N. J.	1885.
Prof. James Law	Ithaca, N. Y.	1872.
Dr. Samuel L. Ledbetter	Birmingham, Ala.	1887.
Dr. Benjamin Lee	Philadelphia, Pa.	1874.
Hon. James E. Lee, Jr.	Memphis, Tenn.	1887.
Dr. William Lee	Washington, D. C.	1874.
Dr. Henry Leffman	Philadelphia, Pa.	1884.
L. Z. Leiter, Esq.	Chicago, Ill.	1876.
Dr. B. B. Lenoir	Lenoir's, Tenn.	1879.
Hon. William P. Lethworth	Glen Iris, Portageville, N. Y.	1874.
Dr. H. H. Levy	Richmond, Va.	1878.
Dr. Eugene R. Lewis	Kansas City, Mo.	1884.
Dr. Francis W. Lewis	Philadelphia, Pa.	1874.
Dr. Charles A. Lindsley	New Haven, Conn.	1875.
Dr. J. Berrien Lindsley	Nashville, Tenn.	1877.
Dr. J. M. Lindsley	Nashville, Tenn.	1879.
Dr. D. A. Linthicum	Helena, Ark.	1887.
Dr. Elbridge Lippincott	Memphis, Tenn.	1887.
Harvey C. Lowrie, C. E.	Denver, Col.	1886.
Dr. Richard L. Macdonnell	Montreal, P. Q.	1886.
Alan Macdougall, C. E.	Toronto, Ont.	1886.
Dr. James H. Maddox	Stafford, Miss.	1887.
Dr. Solon Marks	Milwaukee, Wis.	1876.
Dr. E. J. Marsh	Paterson, N. J.	1872.
Dr. Robert Martin	Milwaukee, Wis.	1885.
Charles D. Marx, C. E.	Ithaca, N. Y.	1886.
Dr. John E. Mason	Washington, D. C.	1885.
Dr. R. B. Maury	Memphis, Tenn.	1880.
Dr. Charles McClellan	Trenton, Ont.	1886.
Dr. J. H. McClelland	Pittsburgh, Pa.	1885.
Dr. J. H. McCollom	Boston, Mass.	1884.
Dr. J. N. McCormack	Bowling Green, Ky.	1880.
Dr. John McCurdy	Youngstown, Ohio.	1887.
Dr. John R. McDill	Milwaukee, Wis.	1888.
Dr. L. D. McIntosh	Chicago, Ill.	1888.
Dr. W. Page McIntosh, U. S. M. H. S.	New Orleans, La.	1885.
Wilbur F. McKelvy, Esq.	Pittsburgh, Pa.	1888.
W. P. McLaren, Esq.	Milwaukee, Wis.	1888.
Hon. Albert L. McNeal	Bolivar, Tenn.	1879.
Dr. John A. Mead	Pearlington, Miss.	1880.
Dr. Alfred Mercer	Syracuse, N. Y.	1886.
Hon. George A. Mercer	Savannah, Ga.	1881.
Niles Meriwether, C. E.	Memphis, Tenn.	1887.
Dr. Charles N. Metcalf	Indianapolis, Ind.	1885.
Henry C. Meyer, C. E.	New York City.	1882.
Dr. John J. Milhau	New York City.	1873.
Dr. John B. Minor	University of Virginia, Va.	1878.
Andrew S. Mitchell	Milwaukee, Wis.	1888.

Dr. Charles Mitchell	Nashville, Tenn.	1884.
Dr. Henry Mitchell	Asbury Park, N. J.	1886.
Dr. R. W. Mitchell	Memphis, Tenn.	1878.
Dr. L. H. Montgomery	Chicago, Ill.	1879.
Dr. Frederick Montizambert	Gross Isle, Quebec, P. Q.	1885.
Dr. J. Fred Moore	Brooklyn, N. Y.	1886.
Robert Moore, C. E.	St. Louis, Mo.	1880.
Dr. Emma W. Mooers	Arlington, Mass.	1888.
David Percy Morgan	Chicago, Ill.	1885.
Dr. John Morris	Baltimore, Md.	1874.
Dr. J. Cheston Morris	Philadelphia, Pa.	1883.
Henry C. Morse	Minneapolis, Minn.	1887.
Dr. P. J. Murphy	Washington, D. C.	1885.
Alexander W. Murray	Chicago, Ill.	1884.
Dr. Robert D. Murray, U. S. M. H. S.	Key West, Fla.	1872.
Frank Nadler	Rock Island, Ill.	1887.
Dr. John T. Nagle	New York City.	1874.
Dr. A. Nash	Joliet, Ill.	1887.
Dr. Herbert M. Nash	Norfolk, Va.	1878.
Dr. Richard A. Neale	Washington, D. C.	1885.
Dr. E. M. Nelson	St. Louis, Mo.	1884.
Dr. R. B. Nevitt	Toronto, Ont.	1886.
Dr. W. H. Newell	Jersey City, N. J.	1882.
Dr. William K. Newton	Paterson, N. J.	1883.
Dr. Edgar H. Nichols, U. S. M. H.	Savannah, Ga.	1882.
F. A. Nims, Esq.	Muskegon, Mich.	1883.
Dr. R. J. Nunn	Savannah, Ga.	1881.
Dr. M. C. O'Connor	New Haven, Conn.	1888.
Dr. Max Ohlemann	Milwaukee, Wis.	1888.
Dr. William Oldright	Toronto, Ont.	1883.
Fred Law Olmstead, Esq.	Brookline, Mass.	1872.
Hon. William T. O'Reilly	Toronto, Ont.	1886.
Dr. H. S. Orme	Los Angeles, Cal.	1885.
Prof. Edward Orton	Columbus, Ohio.	1874.
Michael J. O'Shaughnessy	Huntsville, Ala.	1879.
Dr. Andrew Otterson	Brooklyn, N. Y.	1879.
Dr. William C. Otterson	Brooklyn, N. Y.	1887.
Dr. George W. Overall	Memphis, Tenn.	1886.
F. N. Owen, C. E.	New York City.	1883.
Dr. J. M. Partridge	South Bend, Ind.	1881.
Dr. Ozias W. Peck	Oneonta, N. Y.	1887.
Henry E. Pellew, Esq.	Katonah, N. Y.	1876.
Dr. Maurice Perkins	Schenectady, N. Y.	1888.
Dr. D. L. Phares	Agricultural College, Miss.	1880.
Dr. Hugo Philler	Waukesha, Wis.	1888.
Dr. Joseph H. Pitman	North Conway, N. H.	1886.
Dr. Edward Playter	Ottawa, Ont.	1886.
Dr. Samuel C. Plummer	Rock Island, Ill.	1888.
Dr. J. D. Plunkett	Nashville, Tenn.	1878.
Miss Emma C. G. Polson	New Haven, Conn.	1888.

Dr. D. T. Porter	Memphis, Tenn.	1879.
Dr. Joseph Y. Porter, U. S. A.	Key West, Fla.	1878.
Dr. Thomas K. Powell	Dacyville, Tenn.	1879.
Dr. Charles H. Preston	Davenport, Ia.	1885.
Dr. Charles W. Preston	Brooklyn, N. Y.	1888.
Dr. C. O. Probst	Columbus, Ohio.	1886.
Dr. J. C. Pumpelly	Morristown, N. J.	1885.
Dr. H. W. Purnell	Memphis, Tenn.	1879.
Dr. I. N. Quimby	Jersey City, N. J.	1885.
Dr. Francis Rae	Oshawa, Ont.	1886.
John E. Randall	Memphis, Tenn.	1887.
Dr. John H. Rauch	Chicago, Ill.	1872.
Dr. Joseph H. Raymond	Brooklyn, N. Y.	1882.
Dr. J. W. Redden	Topeka, Kan.	1887.
Hon. Harrison Reed	Jacksonville, Fla.	1888.
Dr. R. Harvey Reed	Mansfield, Ohio.	1884.
Dr. J. T. Reeve	Appleton, Wis.	1876.
Dr. James E. Reeves	Chattanooga, Tenn.	1872.
Dr. B. O. Reynolds	Lake Geneva, Wis.	1884.
Dr. Walter B. Reynolds	Wilmington, Del.	1888.
Dr. Albert R. Rice	Springfield, Mass.	1884.
Mrs. E. H. Richards	Boston, Mass.	1888.
C. L. Richards	Davenport, Ia.	1887.
C. Gordon Richardson	Toronto, Ont.	1886.
Dr. C. T. Richardson	Charleston, W. Va.	1881.
Dr. Dwight A. Richardson	Shelton, Conn.	1885.
Maj. Henry B. Richardson, C. E.	New Orleans, La.	1880.
Dr. W. L. Richardson	Boston, Mass.	1875.
Dr. Felix T. Rivailles	Altoona, Pa.	1888.
Dr. William C. Rives, Jr.	113 E. 38th St., New York City.	1885.
Dr. John B. Roberts	Philadelphia, Pa.	1886.
James S. Robinson	Memphis, Tenn.	1887.
Dr. A. Robillard	Ottawa, Ont.	1886.
Dr. Thomas A. Rodger	Montreal, P. Q.	1886.
Dr. George H. Rohé	Baltimore, Md.	1880.
Dr. Henry W. Rose	Westerly, R. I.	1886.
Anthony Ross	Memphis, Tenn.	1887.
Dr. Ross B. Rowe	Reading, Pa.	1888.
J. B. Rozier	Memphis, Tenn.	1887.
Dr. Thomas P. Russell	Oshkosh, Wis.	1888.
Dr. R. Rutherford	Houston, Tex.	1879.
Dr. Isaac Ryall	Hamilton, Ont.	1886.
D. E. Salmon, D. V. M.	Washington, D. C.	1883.
Dr. Lucien F. Salomon	New Orleans, La.	1879.
Prof. J. Leonard Sanford	New Haven, Conn.	1885.
Prof. D. A. Sargent	Cambridge, Mass.	1883.
Dr. Wilbur T. Sarles	Sparta, Wis.	1888.
Dr. Adolf F. Saurehering	Mayville, Wis.	1888.
Dr. D. D. Saunders	Memphis, Tenn.	1879.
Dr. N. J. Sawyier	Frankfort, Ky.	1879.

Dr. John H. Sears	Waco, Tex.	1887.
Dr. Nicholas Senn	Milwaukee, Wis.	1888.
Dr. J. L. Shepard	Sheboygan Falls, Wis.	1888.
Dr. George R. Shepherd	Hartford, Conn.	1886.
Dr. B. Franklin Sherman	Ogdensburg, N. Y.	1887.
Dr. John J. Sherman	Marinette, Wis.	1888.
Dr. John D. Shull	Hightstown, N. J.	1888.
Dr. F. L. Sim	Memphis, Tenn.	1885.
Dr. T. Grange Simons	Charleston, S. C.	1881.
Dr. James Simpson	San Francisco, Cal.	1886.
Dr. A. Grant Sinclair	Memphis, Tenn.	1887.
Dr. C. M. Sitman	Greensburg, La.	1878.
Dr. Charles Smart, U. S. A.	Washington, D. C.	1882.
Dr. James A. Smeallie	Canajoharie, N. Y.	1887.
Samuel M. Smedley, C. E.	Philadelphia, Pa.	1874.
Dr. Charles D. Smith	Portland, Me.	1885.
Dr. David S. Smith	Chicago, Ill.	1880.
Dr. Joel W. Smith	Charles City, Ia.	1888.
Dr. Joseph R. Smith, U. S. A.	Los Angeles, Cal.	1874.
Dr. Stephen Smith	New York City.	1872.
Dr. Theobald Smith	Washington, D. C.	1888.
Hon. W. J. Smith	Memphis, Tenn.	1878.
Dr. William M. Smith	Rosebank, N. Y.	1880.
Dr. Whitmore Snively	Pittsburgh, Pa.	1873.
Dr. Andrew B. Somers	Omaha, Neb.	1888.
Dr. S. B. Sperry	Delafield, Wis.	1888.
Dr. Joseph Spiegelhalter	St. Louis, Mo.	1880.
Dr. Franklin Staples	Winona, Minn.	1885.
Dr. Ralph E. Starkweather	Springfield, Ill.	1879.
Hon. Lewis H. Steiner	Baltimore, Md.	1872.
Dr. George M. Sternberg, U. S. A.	Baltimore, Md.	1884.
Dr. James A. Steuart	Baltimore, Md.	1874.
Dr. Eugene F. Storke	Milwaukee, Wis.	1888.
Dr. W. R. D. Sutherland	Winnipeg, Manitoba.	1886.
Dr. R. M. Swearingen	Austin, Tex.	1880.
Dr. John Sweetland	Ottawa, Ont.	1886.
Dr. R. P. Talley	Belton, Tex.	1880.
Albert B. Tavel, Esq.	Nashville, Tenn.	1879.
Dr. John N. Taylor	Crawfordville, Ind.	1887.
M. Louise Thomas	New York City.	1888.
Dr. Theodore G. Thomas	New York City.	1888.
Dr. Pinckney Thompson	Henderson, Ky.	1879.
Dr. Sidney Thompson	Kerrville, Tenn.	1887.
Dr. James Thorburn	Toronto, Ont.	1886.
Dr. G. B. Thornton	Memphis, Tenn.	1879.
Dr. C. W. Tolles	Claremont, N. H.	1885.
Dr. Joseph M. Toner	Washington, D. C.	1872.
Dr. Albert R. Torgersen	Canby, Minn.	1888.
Dr. Edwin C. Town	Philadelphia, Pa.	1888.
Dr. Smith Townshend	Washington, D. C.	1878.

Dr. Robert Tracy	Belleville, Ont.	1886.
Dr. George E. Trescott	Greenville, S. C.	1878.
Dr. Thomas J. Turner, U. S. N.	Coldwater, Mich.	1877.
Dr. Gerrard G. Tyrrell	Sacramento, Cal.	1885.
Dr. W. C. Van Bibber	Baltimore, Md.	1875.
Dr. J. H. Van Deman	Chattanooga, Tenn.	1873.
Dr. F. P. Vandenbergh	Buffalo, N. Y.	1888.
Dr. E. V. Van Norman	San Diego, Cal.	1882.
Dr. B. A. Vaughan	Columbus, Miss.	1882.
Dr. Victor C. Vaughan	Ann Arbor, Mich.	1883.
Dr. W. W. Vinnedge	Lafayette, Ind.	1882.
Dr. John H. Vivian	Mineral Point, Wis.	1888.
Dr. Henry P. Walcott	Cambridge, Mass.	1880.
Dr. John P. Wall	Tampa, Fla.	1875.
Dr. David L. Wallace	Newark, N. J.	1885.
Shippen Wallace, Ph. D.	Burlington, N. J.	1885.
Dr. Ralph Walsh	Washington, D. C.	1885.
L. B. Ward, C. E.	Jersey City, N. J.	1885.
Dr. Horace Wardner	Anna, Ill.	1877.
Col. George E. Waring, C. E.	Newport, R. I.	1875.
Dr. R. B. Watkins, U. S. M. H. S.	Detroit, Mich.	1885.
Dr. Irving A. Watson	Concord, N. H.	1881.
Dr. J. Madison Watson	Elizabeth, N. J.	1882.
Dr. R. D. Webb	Birmingham, Ala.	1878.
Albert L. Webster	New York City.	1885.
Dr. Warren Webster, U. S. A.	Washington, D. C.	1873.
Dr. Joseph M. Wells	Camden, N. J.	1887.
Dr. H. P. Wenzel	Milwaukee, Wis.	1888.
Dr. William C. Wey	Elmira, N. Y.	1872.
William Whelans	Ottawa, Ont.	1886.
Dr. Octavius A. White	New York City.	1876.
Dr. N. W. Wickwire	Halifax, N. S.	1886.
Dr. J. Louis Williamson	Milwaukee, Wis.	1888.
Dr. A. F. Winchell	New Haven, Conn.	1886.
Dr. William B. Winston	Memphis, Tenn.	1887.
Dr. Simeon P. Wise	Millersburg, Ohio.	1886.
Dr. G. F. Witter	Grand Rapids, Mich.	1877.
Prof. Edward S. Wood	Boston, Mass.	1876.
Dr. Thomas F. Wood	Wilmington, N. C.	1878.
Dr. A. A. Woodhull, U. S. A.	Fort Leavenworth, Kan.	1874.
William E. Worthen, C. E.	New York City.	1872.
Dr. A. R. Wright	Buffalo, N. Y.	1881.
Dr. Daniel F. Wright	Clarksville, Tenn.	1888.
Dr. George Wright	Toronto, Ont.	1886.
Dr. John Wright	Sardis, Miss.	1879.
Dr. Walter Wyman, U. S. M. H. S.	Washington, D. C.	1884.
Dr. H. B. Yeomans	Mt. Forest, Ont.	1886.
Dr. A. G. Young	Augusta, Me.	1885.
Dr. Francis J. Young	Bridgeport, Conn.	1887.
Andrew Young	Chicago, Ill.	1884.
John Preston Young	Memphis, Tenn.	1888.

ASSOCIATE MEMBERS.

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William H. Bates	Memphis, Tenn.	1887.
Wm. Henry Bingham	Memphis, Tenn.	1887.
John Wm. X. Brown	Memphis, Tenn.	1887.
W. H. Carroll, Esq.	Memphis, Tenn.	1887.
Wm. J. Chase	Memphis, Tenn.	1887.
William Livingston Clark	Memphis, Tenn.	1887.
Z. N. Estis	Memphis, Tenn.	1887.
J. T. Fargason	Memphis, Tenn.	1887.
Donald R. Farquharson	Fletcher P. O., Tilbury East, Ont.	1887.
John F. Frank	Memphis, Tenn.	1887.
Jacob S. Galloway	Memphis, Tenn.	1887.
John Gaston	Memphis, Tenn.	1887.
Thos. J. Graham	Memphis, Tenn.	1887.
Richard C. Graves	Memphis, Tenn.	1887.
A. D. Gwynn	Memphis, Tenn.	1887.
William Heaps	Memphis, Tenn.	1887.
John F. Holst	Memphis, Tenn.	1887.
John Johnson	Memphis, Tenn.	1887.
Whurton S. Jones	Memphis, Tenn.	1887.
Moses D. Katzenberg	Memphis, Tenn.	1887.
William J. Lemp	St. Louis, Mo.	1884.
Thomas J. Latham	Memphis, Tenn.	1887.
William J. Mallory	Memphis, Tenn.	1887.
James C. McDavitt	Memphis, Tenn.	1887.
J. S. Menkin	Memphis, Tenn.	1887.
Jno. Jas. Miles	Memphis, Tenn.	1887.
C. Monjeau	Cincinnati, Ohio.	1887.
Hazen Mooers	Milwaukee, Wis.	1888.
James G. Mowatt	Toronto, Ont.	1886.
H. M. Neely	Memphis, Tenn.	1887.
George B. Peters, Esq.	Memphis, Tenn.	1887.
Gilbert V. Rambout	Memphis, Tenn.	1887.
Hudson Sampson, Esq.	Pittsburgh, Pa.	1886.
Roland H. Smith	Pittsburgh, Pa.	1887.
John K. Speed	Memphis, Tenn.	1887.
T. F. Tobin	Memphis, Tenn.	1887.
Stephen C. Toof	Memphis, Tenn.	1887.
A. B. Treadwell	Memphis, Tenn.	1887.
A. C. Treadwell	Memphis, Tenn.	1887.
Walter F. Wells	Winthrop, Mass.	1885.
Rev. Joseph Wild, D.D.	Toronto, Ont.	1886.

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Dr. J. B. Russell, LL.D.	Glasgow, Scotland.	1886.
Mrs. Elizabeth Thompson	New York City.	1887.

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